

Seeing the Forest Beyond the Trees

**New possibilities and expectations for products
and services from small-scale forestry**

**June 7-11, 2009
Morgantown, West Virginia (USA)**

Proceedings of the 2009 IUFRO 3.08 Small-Scale Forestry Symposium

Seeing the Forest Beyond the Trees:
New possibilities and expectations for products and services from small-scale forestry

Edited by Kate Piatek, Ben Spong, Steve Harrison, and Dave McGill

Sponsored by :
West Virginia University
USDA Forest Service—Northern Research Station
IUFRO Special Programme for Developing Countries
—funded by the Korea Forest Research Institute
Penn State University
USDA Cooperative Research, Education, and Extension Service

Morgantown, West Virginia, USA
June 7 -11, 2009

PREFACE

Forests across the globe are under increasing pressure to provide society with economic, social, and ecologic benefits. As the human population expands into rural agricultural and forest settings, the need to produce more from less becomes more apparent. As available forestland shrinks, small-scale forest ownerships take on an increasingly important role in the production of forest products and ecosystem services. However, interest of small-scale landowners in sustainable management, applicability and profitability of management at these scales are challenges for professional foresters and policy-makers alike.

In the 2009 IUFRO 3.08 Small-Scale Forestry Symposium, we come together in the mountains of West Virginia to address these challenges. Our symposium theme *Seeing the forest beyond the trees: New possibilities and expectations for products and services from small-scale forestry* aims to touch on many of the crucial issues and opportunities facing the small landholder and the political, management, and economic contexts in which they operate. The topics of interest featured at this symposium include new and emerging opportunities for small-scale forests, sustainable agroforestry, policy formulation, amenity values of small scale forestry, and economic valuation.

Seeing the forest beyond the trees will be attended by over 60 participants from 16 countries. Our home languages may be different, but through this interaction and sharing of our experiences we hope to learn from and support each other in the exploration of sustainable small-scale forestry.

We welcome you to Morgantown, West Virginia and to this year's IUFRO Small-Scale Forestry symposium.

Kathryn B. Piatek, Chair
Scientific Committee

David W. McGill, Chair
Organizing Committee

CONFERENCE OBJECTIVE

To bring together researchers and managers to share their experiences in policy development, management, and economics of contemporary small-scale forest products and services.

OVERVIEW OF SYMPOSIUM

The 2009 IUFRO 3.08 Small-Scale Forestry Symposium features 50 presentations by delegates from 16 countries. The theme of the symposium Seeing the Forest Beyond the Trees brings together insights into new practices, innovative programs, and recent policies that focus on sustainable management of small-scale forestry, with an intended focus on environmental services.

SYMPOSIUM COMMITTEES

The organizing committee coordinated and carried out the planning, logistics, budgeting, and advertisement of the symposium. Committee members included K. Arano, D. Baumgartner, B. Butler, S. Dimmick, S. Harrison, J. Herbohn, M. Jacobson, D. McGill (chair), K. Piatek, and B. Spong. The scientific committee selected of abstracts and reviewed manuscripts presented in the proceedings. Scientific Committee members included K. Arano, D. Baumgartner, K. Blatner, J. Bliss, B. Butler, P. Dargusch, S. Harrison, M. Jacobsen, D. McGill, M. Medved, A. Niskanen, K. Piatek (chair), B. Spong, and T. Venn.

FINANCIAL SUPPORT

Special thanks go to the individuals and organizations that provided financial contributions to the symposium. Generous contributions were received from the USDA Forest Service Northern Research Station, USDA Cooperative Research, Education, and Extension Service, the West Virginia University Division of Forestry and Natural Resources, the WVU Extension Service, WVU Davis College of Agriculture, Forestry, and Consumer Sciences, the WVU Office of the Provost, and IUFRO's Special Programme for Developing Countries through funding from the Korea Forest Research Institute.

CITATION FOR THIS VOLUME

Piatek, K.B., B.D. Spong, S. Harrison, and D.W. McGill. 2009. Seeing the Forest Beyond the Trees: New possibilities and expectations for products and services from small-scale forestry. Proceedings of the 2009 IUFRO 3.08 Small-Scale Forestry Symposium. June 2009, Morgantown, WV, United States: West Virginia University, Division of Forestry and Natural Resources.

TABLE OF CONTENTS

SYMPOSIUM PAPERS	8
Bridging entrepreneurial innovation and public environmental values in small-scale forestry with the “New Public Service” model of public administration <i>MARIE APPELSTRAND</i>	9
Farmer Woodlots Development in Sri Lanka: Gains, Losses and Remedies <i>MANGALA DE ZOYSA AND MAKOTO INOUE</i>	23
Backyard Woodlots: Large Scale Education for Small Acreages <i>ADAM K. DOWNING, JONATHAN KAYS, AND JAMES FINLEY</i>	31
Property Taxes and Forests in West Virginia: A Historical Review <i>JENNY FORTNEY AND KATHRYN G. ARANO</i>	42
Choosing What to Believe About Forests: Differences Between Professional and Non-Professional Evaluative Criteria <i>ROJE S. GOOTEE, KEITH A. BLATNER, AND DAVID BAUMGARTNER</i>	55
The Revival of Firewood Use in Queensland, Australia <i>STEVE HARRISON AND JACK BAYNES</i>	68
Truth, Lies and Something in between: Kaleidoscopic thoughts on the role of beyond timber products <i>CHRISTOPH HARTEBRODT</i>	80
Are Smallholders Really Interested in Extension Services for Non-Timber Products? <i>CHRISTINA HOCK AND CHRISTOPH HARTEBRODT</i>	94
Development phases of forest planning activity in privately owned land: A planning work perspective <i>RAILI HOKAJÄRVI, JUKKA TIKKANEN AND TEPPU HUJALA</i>	106
Adaptive consultation: a tool for recognizing family forest owners' amenity values <i>TEPPU HUJALA, MIKKO KURTTILA, JUKKA TIKKANEN, PEKKA LESKINEN AND LEENA A. LESKINEN</i>	118
Recreational Value Trading (RVT) provides a new source of income for forest owners <i>ERNO JÄRVINEN AND LEA JYLHÄ</i>	128
Backyard Woodlots: FILLING THE SMALL ACREAGE SERVICE PROVIDER GAP WITH THE GREEN INDUSTRY <i>JONATHAN KAYS, ADAM K. DOWNING, AND JAMES FINLEY</i>	134
Forest landowners' preferences for forestry extension services in North Carolina <i>TERHI KOSKELA, DENNIS HAZEL, ROBERT BARDON AND MARK MEGALOS</i>	144
SMALL SCALE FOREST OWNERS' RESPONSIBILITY – economic, societal, and environmental <i>LARS LÖNNSTEDT</i>	148
Forestry Flix: Evaluating the Netflix Model for Accessing Urban and Rural Populations in the Central Appalachian Region Using a Web-based DVD Circulation Program <i>DANIEL J. MAGILL AND DAVID W. MCGILL</i>	161

Agroforestry Technologies for Pulp and Paper Contract Farmers <i>BRIAN McDONALD AND BEN SPONG</i>	170
Timber Harvesting on Slovenian Family Farms <i>MIRKO MEDVED</i>	181
Small Scale and Amenity Focused Forestry: Filling a Market Niche <i>KATIE L. NELSON AND R. BRUCE HULL</i>	193
Attitudes of West Virginia Landowners on the use of prescribed fire as a forest management tool <i>KATHRYN B. PIATEK AND DAVID W. MCGILL</i>	205
Demographic Analysis of Family Forest Owners in Relation to Educational Program Participation <i>MAMINIAINA S. RASAMOELINA, JAMES E. JOHNSON, AND R. BRUCE HULL</i>	216
Woodland owner networks and peer-to-peer learning <i>ELI S. SAGOR, MAUREEN H. MCDONOUGH, AND SHORNA BROUSSARD ALLRED</i>	224
Marketing Intelligence System for Small-Scale Essential Oils Industry of North-Western Ontario <i>CHANDER SHAHI, MATHEW LEITCH AND SERGE LAFOREST</i>	227
Making Forestry Sustainable: Recent Israeli Innovations in Eucalyptus Farming and Carbon Sequestration <i>ALON TAL AND BEN GURION</i>	237
Benefits of restoring degraded forest lands in Ghana <i>TAPANI TYYNELÄ, DAMNYAG, LAWRENCE; APPIAH, MARK; AND PAPPINEN, ARI</i>	245
Public good delivery in private woodlands in England: An empirically-based typology of small-scale private forest owners <i>JULIE URQUHART</i>	255
The effects of wildfire and environmental amenities on property values in northwest Montana, USA. <i>TYRON J. VENN, KYLE M. STETLER AND DAVID E. CALKIN</i>	270
Adoptability of a complex agro-forestry project for smallholders on a Philippine island <i>SONJA VILEI</i>	292
Bio-energy from private forest sector and its importance in Latvia <i>LELDE VILKRISTE</i>	306
Are forestry consultation meetings owner-driven? – Analyzing the interplay between the owner and the planner <i>OUTI VIRKKULA, TEPPU HUJALA, RAILI HOKAJÄRVI AND JUKKA TIKKANEN</i>	318
PRESENTATION ONLY ABSTRACTS	328
The Economics and Procurement of Wood Biomass for Energy Production in Northwestern Ontario <i>BEDARUL ALAM AND REINO PULKKI</i>	329

Forest cooperatives: Vehicles for weaving parcelized forest landscapes for large-scale rural development and forest stewardship outcomes <i>SCOTT BAGLEY, COLIN DONOHUE, AND BRYCE OATES</i>	330
Socio-economic impact of wood based utilization for energy production on small rural communities in northwestern Ontario, Canada. <i>CASSIA SANZIDA BATEN AND REINO PULKKI</i>	331
Small-scale forestry in the United States: Old challenges and new opportunities <i>BRETT J. BUTLER</i>	332
Mitigating climate change through small-scale forestry in the US: Forest management practices and market opportunities <i>SUSAN CHARNLEY AND DAVID DIAZ</i>	333
A review of the constraints to small-scale forest holders engaging in carbon markets <i>PAUL DARGUSCH AND JOHN HERBOHN</i>	334
Products and services from management of fire-adapted forests: The perspectives and practices of family forest owners in Oregon, USA <i>A. PAIGE FISCHER</i>	335
A summary of roundwood utilization in West Virginia in 2008. <i>SHAWN T. GRUSHECKY, JAN WIEDENBECK, AND BEN SPONG</i>	336
The future of Pennsylvania's forests: Engaging private forest landowners in their decision making processes concerning their forestland <i>JOSHUA B. GRUVER, JAMES C. FINLEY, A.E. LULOFF, AND ALLYSON MUTH</i>	337
Truth, lies and something in between--Kaleidoscopic thoughts about present role and prospects of beyond-timber products in a highly industrialized context <i>CHRISTOPH HARTEBRODT</i>	338
Agroforestry systems on small rural properties: a case study in the State of Paraná, Brazil <i>VITOR AFONSO HOEFELICH, ALEXANDRE FRANÇA TETTO, JOSÉ TARCISO FIALHO, AND RENATO VIANA GONÇALVES</i>	339
Small-scale forest management and ecosystem services: Opportunities in the US <i>BILL HUBBARD AND SARAH ASHTON</i>	340
Effect of education on the adoption of woodland management <i>JAMES E. JOHNSON, MAMINIAINA S. RASAMOELINA, AND R. BRUCE HULL</i>	341
Utilization of non-timber forest products in Bangladesh <i>SHIBA P. KAR, AND MICHAEL JACOBSON</i>	342
Family forest owners under the spotlight: the Finnish monitoring system. <i>HEIMO KARPPINEN AND HARRI HÄNNINEN</i>	343
It's the network: How personal relationships shape decisions about private forests <i>DAVID B. KITTRIDGE, MARK G. RICKENBACH, ANGELICA ERAZO, AND EMMA SNELLINGS</i>	344
Seeing the forests for the tourists: Examining nature-based tourism on family forests <i>JESSICA LEAHY AND BRITTANY HUMMEL</i>	345

An opportunity for small-scale forestry in southern Aragua state, Venezuela: planning and policy issues. <i>ARMANDO TORRES LEZAMA, EMILIO VILANOVA, AND HIRMA RAMIREZ-ANGULO</i>	346
Bridging the gap between physical and social availability of timber: How much wood is really available? <i>ZHAO MA AND BRETT J. BUTLER</i>	347
Payments for forest based ecosystem services in the US <i>EVAN MERCER, DAVID COOLEY, AND KATHERINE HAMILTON</i>	348
Leasing state forest land to local people in Bangladesh: Does the policy enhance forest conservation and improve rural livelihood? <i>TAPAN KUMAR NATH AND MAKOTO INOUE</i>	349
Educating family forest landowners about cultural resources <i>ANDREW B. PERLEBERG, JAMES FREED, AND DAVID BAUMGARTNER</i>	350
On Improving the Triple Bottom Line Returns: The SAFEST (Sustainable Agro-Forestry Ecological Farming Enterprise, Science and Technology Project) Way <i>FLORENCE Z. TARUN-ACAY</i>	351
Extent of forestry practices in a federal cost share program in West Virginia, USA <i>ELIZABETH TICHNER, DAVID W. MCGILL, WILLIAM GRAFTON, AND JENNIFER STEELE</i>	352
Made in the shade: Nontimber forest product social and knowledge networks <i>DAVID WILSEY AND JULIE MEIDTKE</i>	353

SYMPOSIUM PAPERS

BRIDGING ENTREPRENEURIAL INNOVATION AND PUBLIC ENVIRONMENTAL VALUES IN SMALL-SCALE FORESTRY WITH THE “NEW PUBLIC SERVICE” MODEL OF PUBLIC ADMINISTRATION

Marie Appelstrand¹

Abstract--The forest sector is under increasing pressure to change and reform, and this includes a stronger emphasis on market-based incentives for forestry activities and a search for means to enhance productivity and develop new sources of income. For many small-scale forest owners in the European Union economic diversification has become a necessity, and they are entering a new and different role that combines entrepreneurial innovation with strategic changes, which must coincide with the supporting public policy framework. This development is in line with the growing trend towards deregulation and less state intervention in environmental management, implying a stronger emphasis on new governance structures and market-driven processes. The paper analyzes the transformation of environmental public administration using a model representing three different perspectives on administration’s role, values and meaning, showing state action’s progressive transition from ‘rowing’ to ‘steering’ to ‘serving’ and facilitating. Finally, a Swedish case-study is used to exemplify a successful ‘soft law’-inspired, networks-based, less hierarchical decision-making process.

INTRODUCTION

Whereas once traditional environmentalism and policy perceived the free market as an adversary, today private innovation is seen as the wellspring of progress on environmental matters. Some even argue for this to be the ‘new environmentalism’ recognizing the marketplace as an important mechanism for solving problems through incentives. Instead of pursuing punishment, wealth creation – properly harnessed – is seen as the ‘engine’ of environmental progress over the long term perspective. This ‘new environmentalism’ is rooted in a diverse set of de-centralized activities, utilizing the power of cooperation and community. This resonates with the increasing pressure for change in the European forest sector, especially for small-scale forestry to meet new market developments for non-wood forest products and services (NWFP&S), a change that can be seen as a consequence of an underlying long-term shift from wood production to an increased market-based supply of other products and services forests provide (Lunnan *et al.* 2006, Rametsteiner *et al.* 2006, Weiss *et al.* 2007, Niskanen *et al.* 2007). Many small-scale forest owners are entering new and different roles that combine entrepreneurial innovation with strategic changes which must follow the supporting public policy framework to ensure consistency between economic and ecological sustainability. To address these challenges, regulatory design and flexibility are needed that provide incentives for individuals and enterprises to achieve beyond-compliance outcomes within existing regulatory framework.

¹ Lund University, Dept. of Sociology of Law, P.O. Box 42, SE- 221 00 Lund, Sweden (email: marie.appelstrand@soclaw.lu.se)

Increased focus on the societal values of the forest corresponds with the recent trend in the Nordic countries towards shifting from hierarchical government regulation to new modes of governance including voluntarism and market-driven processes. Softer forms of governance and collaborative processes that are more inclusive than traditional legislation facilitated cooperation on the basis of parity between state and private actors. This is of special interest to the forest sector as new forestry uses entail interest clashes between different economic, ecological and cultural views of nature. At the local and regional level stakeholders - private land owners, managers, local community-inhabitants, external entrepreneurs and businesses, authorities and non-governmental organisations - often have fundamentally different values and aspirations concerning the relationship with the natural world. At the national and global level these conflicts comprise policy makers, lobby groups and researchers. Resulting conflicts in practice are often very costly, both time-wise and money-wise, and added to this is the problem that different groups of stakeholders often are speaking a different “language” when it comes to controversial issues (Boström 2004, Appelstrand 2007, Sundström 2005). To reduce these conflicts we need to develop new approaches to natural resource management that seek to understand varying stakeholder values and reduce the likelihood of potential conflicts. In the forestry sector with a multitude of actors claiming their different views and perceptions, public administration has an important role to play in order to co-ordinate these interests and finding ways around the tension between private (forest owners’) interests and public (both of the state and the public in general) interests, in short: bridging public environmental values and private entrepreneurial interests.

Rural entrepreneurship is a multi-faceted, complex economic and social phenomenon involving a broad range of actors, and it demands institutional support in all the multiple dimensions of decision making, from the individual firm at the local level, to the region and national level. Policies and administrative structures affecting new practices in rural forestry must therefore endorse a more systematic cross-sectoral interaction to be able to provide support and knowledge at early innovation stages (Kubeczko *et al.* 2006). Knowledge building and knowledge exchange between the local community level and the public administrators and policymakers is of utmost importance for the establishment and growth of successful enterprises. This paper analyzes the transformation of environmental public administration in a governance-context and its capacity to meet the new demands of diversified forestry use. A model representing three different perspectives on administration’s role, values and meaning in obtaining goals, showing state action’s progressive transition from ‘rowing’ to ‘steering’ to ‘serving’ and facilitating. Through this model, I argue that the spirit of the ‘New Public Service’, an alternative to both traditional and now-dominant managerial models of public management, is the most conducive form for further growth and development of diversified forest uses. Finally, a Swedish case-study of ‘Östra Vätterbranterna’ exemplifies a successful ‘soft law’-inspired, networks-based, less hierarchical decision-making process.

FROM GOVERNMENT TO GOVERNANCE

The concept ‘governance’ has become popular in social scientific discussions in recent years, and has been used to describe many different phenomena (Rhodes 2000, Pierre 2000, Pierre and Peters 2000, van Kersbergen and van Waarden 2004, Kjaer 2004, Eckerberg and Joas 2004). One common denominator is that some form of shift is demarcated; various studies describe how organizations and public administration adapt to changes in the world around them through a

(supposed) change from more hierarchical steering to what Mayntz (2003, p 1) describes as ‘non-hierarchical political control’. It has been questioned whether such comprehensive changes have indeed taken place that can be described as a shift towards governance-influenced steering, or if only symbolic changes such as redefining existing forms of regulation have taken place. The more recent understanding and development of the governance concept emphasises the public-private interaction where relations between various levels of government and civic organisations, private enterprises and social networks are important units of research. This is described as a shift towards more or less self-regulating processes emerging at the local level within the field of environmental governance, while the role of the state has changed from authoritative allocation from above to the role of activator (Eising and Kohler-Koch 2000). In the light of this development traditional approaches of control and command and enforcements are being viewed as less effective and efficient. New forms of governance have come to replace them, making way for what has been called ‘smart regulation’: the use of a variety of more flexible, pluralistic approaches where the relationship between state authorities and forest owners has altered from one of master and subject to one resembling partnership (Gunningham and Grabosky 1998, Appelstrand 2002, 2007, Gunningham *et al.* 2003). Here softer, non-coercive means such as information, knowledge transfer and advisement are central features of the activities of the previously regulatory-oriented authorities. Likewise, the dynamics of partnership – inclusion, participation, consultation, mutual respect, the development of common frames of reference, have become a central feature of governance models.

The development of governance and the changed role of public administration has been especially significant in the environmental sphere according to Eckerberg and Joas who observe “how more or less self-regulating processes are emerging at the local level within the field of environmental governance”, which can be explained by the fact that “(local) environmental policy-making structures are of a rather recent date in many countries” (2004, p 409, 405). From an environmental policy perspective, very important horizontal shifts are taking place at all levels – local, regional, national and international (especially at the EU level) entailing the transfer of responsibility from the state to other actors. By extension this means that the scope of the political process is widened, becoming more open to influences from ‘new’ political actors who then come to limit the autonomy of local and regional administrations. New policy instruments and combinations of already existing steering mechanisms need to be introduced to involve more actors and groups (Eckerberg and Joas 2004). By using the concept of governance as a multi-theoretical tool we can describe and study the following shift in the way public administration operates: how steering, regulation and organizing has changed from more traditional hierarchical structures to softer, flexible processes based in co-operation.

A revised approach to environmental issues – from problem solving to prevention – has resulted in a process that has furthered development thinking about governance structures and rethought the role of public administration (Michanek and Zetterberg 2008). Different approaches resonate in different time periods, even though the renewed emphasis by governments and environmental groups on market mechanisms is striking, because reliance on private markets to resolve environmental problems had, until recently, been eschewed for ideological reasons but also because empirical evidence of success is mixed (Cashore *et al.* 2005). In the early 1970s, when people increasingly became aware of and protested against environmental degradation, the response of most Western states was to initiate a long list of laws in line with a command-and-control model – ‘Hard Law’ (that is to say traditional, direct regulation from above). Even if this

form of steering never has fully succeeded in supplanting other forms of social control, such as education, information, and voluntary agreements, it has been the predominant thinking and led policy formulation under a long period of time. The reliance on direct regulation has increasingly become subject to criticism, as it was found to be both ineffective and powerless (Gunningham and Grabosky 1998). During the 1980s, neo-liberal tendencies appealed for extensive deregulation. Self-regulation of the market and various voluntary proprietary initiatives were believed to be able to replace much of the rigid regulation system. (In Sweden this tendency arose already in the early 1980s with a wave of privatization of previously public tasks). This deregulation trend met resistance both from the general public and environmental organizations – arguing that there had to be a basic regulatory structure upon which deal with environmental questions. Even if the standard form of centralized, bureaucratic, traditional legal steering was found by many critics to be a plodding and expensive way of dealing with environmental issues, one should not forget that this type of steering has in fact succeeded in dampening environmental destruction in several areas, including improving water and air quality. Furthermore, critics often overlook the practical reality of many state authorities charged with implementing policy; they are often hindered in carrying out their activities due to a lack of financial and personnel resources. Further, command-and-control steering surely has limitations with regard to more complex, systemic environmental problems, such as climate change or the decline of biological diversity.

The inefficiency of command-and-control regulation and the problems of deregulation have been addressed by several studies of regulatory policy (Stjernquist 1973, Eckerberg 1987, Gunningham *et al.* 2003). Some even argue that this problem can be avoided by designing a ‘smart regulation’, invoking a broader vision of regulation and policy mixes, and utilizing combinations of instruments and actors (Gunningham and Grabosky 1998, Cashore *et al.* 2005). Such a mix of policy instruments could entail self-regulation and co-regulation as well as improving the effectiveness and efficiency of more conventional forms of direct governmental regulation.

SOFT LAW - A CHANGE WITHIN EXISTING REGULATORY FRAMEWORK

Both lawmakers and policy practitioners at the global level, in the EU as well as at the national and local level are striving for less intrusive means of achieving policy goals, and in this development governance represents a formidable policy challenge. The reasons for environmental policy-makers’ interest in adopting voluntary initiatives to complement, supplement, or replace direct government regulation includes, from a government perspective (Moffet and Bregha 1999, Gunningham and Sinclair 2002):

- *the limits of command-and-control regulation*
- *the need to compensate for inadequate regulatory resources*
- *the benefits of promoting dialogue with and raising environmental awareness of the private sector*
- *the attraction of generating beyond-compliance outcomes*

The limits of command-and-control regulation together with a growing interdependence between the global civil society and local levels, has led to an increased demand for governance ‘without government’. This new regulatory mode is characterized as ‘soft law’. We can see the growing use of soft law as an instrument – here defined in terms of non-binding rules such as voluntary

agreements, recommendations, guidelines, codes of conduct, certification etc – both in transnational and national regulation and policy. The enhanced use of soft law as an instrument of transnational regulation is not least visible in the EU, where network governance and soft regulation has become an important policy instrument in traditional areas (like state aid), and now is entering into new policy areas such as forestry (Zielonka 2001). In steering terms one can speak of a shift from ‘hard law’ (command and control) to ‘soft law’ (Mörth 2004, Abbott and Snidal 2000). ‘Soft law’ is defined in this context as “rules of conduct which, in principle, have no legally binding force but which nevertheless have practical effects” (Mörth 2004, p 6). The essence of the definitions is that soft law can be procedurally classified as non-legally binding rules and that it comes in many varieties. The meaning of soft law and its applicability must therefore be considered contextually, from case to case (Snyder 1993). Even though one can make a basic distinction with Mörth (2004, p 1) stating that: “in systems of government the law is hard; in systems of governance the law is soft”, the boundaries between ‘hard’ and ‘soft’ law are, in practice, often blurred and difficult to differentiate. Some legal scholars even claim that the term soft ‘law’ should be avoided and instead one should speak of soft policy, soft instruments or soft regulation (Zito *et al.* 2003). Other authors are reluctant to use soft law as an analytical concept at all, because they consider it to be an empirical term (Ahrne and Brunsson 2004). The most crucial difference - whether one perceives the concept as analytical or empirical - is however that soft law lacks the possibilities of legal sanctions, and hence raises questions of compliance.

CHANGING ROLES AND VALUES FOR ENVIRONMENTAL PUBLIC ADMINISTRATION

State administration has undergone a turbulent period in the past couple of decades, with fundamental changes in the way it operates: steering, regulation and organization have changed in a manner summarized by some public administration researchers as the above mentioned transition from government to governance (Pierre 2000, Pierre and Peters 2000, Van Kersbergen and van Warden 2004, Eckerberg and Joas 2004, Kjær 2004, Beck Jørgensen and Vrangbæk 2004). If one accepts that the shift towards governance oriented steering processes has in fact taken place it is interesting to see how the ‘state’ is dealt within the governance literature. One of the central ideas in this perspective is that the state’s role has been ‘hollowed out’: the power of central administration has weakened through the undermining of the state’s capacity to steer society from above, what Pierre (2000) actually described as “the erosion of traditional bases of political power” (cited in Eckerberg and Joas 2004, p 406). This can in part be traced to an increased specialization and complexity within the public sector which has led to both vertical and horizontal shifts: operations and decision making have both been delegated *upwards* to international organs and the EU, as well as *outwards* to private actors, companies and organizations, as well as *downwards/inwards* to public authorities and to the municipal level (Eckerberg and Joas 2004, van Kersbergen and van Waarden 2004). Decentralization of power downwards to the local level has also been motivated by democratization, in which the state aspires to place decisions’ closer to the citizenry. Different administrative policy reforms have also entailed many authorities becoming more self-administrating/autonomous through an increased emphasis on goal and result steering (Premfors 1998, Tarschys 2004).

Governance thus does not entail that the state’s role is reduced or loses importance, but rather that it *changes*. An increased awareness of the necessity to cooperate with various societal actors

contains a consciousness of the limitations of traditional command-and-control regulation. A complementary soft law mechanism that to a great extent represents a transition from hierarchical rule-based steering to more communicative, flexible processes is cooperation through various forms of *networks* (network governance), where policies are seen as the result of conduct and exchange within the network through a cooperative process where many different types of actors participate – public, private and voluntary; political, social and administrative (Sundström 2005). In such a network context governance can mean that formal steering instruments and legal steering is *complemented* by softer norms. Van Kersbergen and van Waarden (2004) speak of ‘information management’, that the result of network processes are expressed through ‘soft norm’ formulation in programs of action, guidelines and standards, information and advisement. The role of the state is then - rather than formulating rules, directives or result goals as in accord with the command-and-control model - to create structures and frameworks for the networks to develop a high degree of self-steering, what Sørensen (2004) calls ‘metasteering’. The state thus steers via formulating the overarching problem, by setting the frame for the organization of the policy network, financing and means of operation as well as through impacting the thought of the actors in the policy network about what the problem is and how it should be solved – that is to say by creating identity and meaning (Sundström 2005).

Three perspectives on public administration – from rowing to steering to serving

To analyse the transformation of the role and values of public administration in a governance-context and hence its capacity to meet up to the new demands of diversified uses of forestry, a model with three perspectives - reaching from the ‘Old Public Administration’ over the ‘New Public Management’ to the ‘New Public Service’ - is used. By using this model (figure 1), I argue that the spirit of the New Public Service is the most conducive one for further growth and development of new practices in forestry. The ideas of the New Public Service as an alternative to both the traditional and the now-dominant managerial model of public management, has come to insure a new set of thoughts and action in the field of environmental public administration. The model illustrates the different roles of government/administration, the organizational structure and ways of achieving goals, and the administrative discretion allowed in the specific structure. To understand how and to what extent these three perspectives have affected the development of public administration, it is important to emphasize that it is not just about the implementation of new techniques, but that each perspective carries with it a set of values and ideals which constitute a fundamental reordering of the idea of what public administration is really about, what can be described as a progressive transition from:

rowing: Old Public Administration, designing and implementing policies, focusing on a single, politically defined objective, to

steering: New Public Management, acting as a catalyst to unleash market forces, over to

serving: New Public Service, negotiating and brokering interests among citizens and community groups, creating shared values

The Old Public Administration represents the kind of government that developed during the industrial era, with sluggish, centralized bureaucracies, preoccupied with rules and regulations, and hierarchical chains of command. Under the Old Public Administration the purpose of government was simply to deliver services efficiently, and problems were to be addressed primarily by changing the organizations’ structure and control systems. The bureaucratic

organizations of this era were marked by top-down authority within agencies and control or regulation of clients. The main role of the government was to ‘row’, designing and implementing policies focusing on a single, politically defined objective.

	Old Public Administration	New Public Management	New Public Service
Role of Government	Rowing - designing and implementing policies focusing on a single, politically defined objective	Steering - acting as a catalyst to unleash market forces	Serving - negotiating and brokering interests among citizens and community groups, creating shared values
Assumed organizational structure	Bureaucratic organizations marked by top-down authority within agencies and control or regulation of clients	Decentralized public organizations with primary control remaining within the agency	Collaborative structures with leadership shared internally and externally
Mechanisms for achieving policy objectives	Administering programs through existing government agencies	Creating mechanisms and incentive structures to achieve policy objectives through private and non-profit agencies	Building coalitions of public, non-profit, and private agencies to meet mutually agreed upon needs
Administrative discretion	Limited discretion allowed administrative officials	Wide latitude to meet entrepreneurial goals	Discretion needed but constrained and accountable
Conception of the public interest	Public interest is politically defined and expressed in law	Public interest represents the aggregation of individual interests	Public interests is the result of a dialogue about shared values

Figure 1. Three perspectives on public administration (Appelstrand 2007)

More recently, *the New Public Management* has come to dominate in the field of public administration and sought to replace the traditional rule-based, authority-driven processes of the Old Public Administration with market-based, competition-driven tactics (Kettl 2000). The New Public Management is grounded on the idea that the best way to understand human behaviour is to assume that governmental and other actors make choices and undertake action based on their own *self-interest*. In this view, the role of government is to unleash market forces so as to facilitate individual choice and to achieve efficiency. Citizens are seen as customers and problems are addressed by manipulating incentives. Osborne and Gaebler elevated the market to a New Public Management-model for all public administration in their classic study (1992) where they challenged administrators to ‘steer, not row’, and in this manner recreate state steering as a sort of *administrative entrepreneurialism*. The decentralized, customer-driven

government should share its burden with private actors by defining programs that others would then carry out, through contracting or other such arrangements. This should take place via increased use of market-based instruments as well as by creating conditions for altered steering forms via decentralization and privatization in different forms (Hirst 2000, Pollitt and Bouckaert 2000, van Kersbergen and van Waarden 2004).

The notion that the reinvented, market-oriented New Public Management should be compared as opposite pole to the centralized bureaucracies of the Old Public Administration is rejected and criticized by a number of opponents. Despite that the 'old' administration has come to be seen as synonymous with bureaucracy, hierarchy, and control, it has many important contributions to society in areas ranging from public health, to national defence, to social security, to transportation, and to the protection of the environment. Most government agencies still follow this basic model of organization and management - or at least this model seems to be the standard position for agencies at all levels of government.

Hierarchical and rigid rule based systems have thus played out their overarching role, and in a time of increased information flow and communication, even institutions must adapt and become more flexible and network-based (Rhodes 2000). Denhardt and Denhardt (2003) take a further step from here in developing the concept public management with what they call *the New Public Service* under the motto '*servicing, not steering*'. Taking its point of departure in the governance perspective, they present an alternative for how modern administration can be organized by lifting citizenship to the central steering process. The New Public Service highlights collaborative structures with shared leadership and cooperation in networks as the central steering process and believe that the primary function of the state is to be *cooperative partner and facilitator* and create the preconditions for a heightened dialogue and cooperation between citizens. The public interest in regard to this development is a result of a dialogue about *shared values*, and it is herein that the incentive for shared leadership between public and individual interest lies: to turn public interest into individual interest. The role of government has in this view undergone a progressive transition from 'rowing' to 'steering' to 'servicing'.

From confrontation to dialogue - The Östra Vätterbranterna Project [ÖVB]

An example of a successful application of 'soft' regulation and innovative forms of steering in line with the ideas of the New Public Service perspective, is the Östra Vätterbranterna (ÖVB) project area in the southern part of Sweden. The ÖVB-area lies on the eastern slopes of Lake Vättern, and is an important area of high biodiversity and threatened species. The area is 43 000 ha of which 23 000 ha is forestry land, with around 1000 real estates. The average size of forestry holdings is 23 ha, and of agricultural land is 12 ha. A long practice of small-scale forestry and agriculture including haymaking, grazing and lopping of tree branches, combined with a lakeside climate contribute to a mosaic of cultural land and deciduous forests with high biodiversity. Today the ÖVB project is underway to protect the biodiversity and the special biota in the area (Asp and Jonsson 2002, Jonsson 2004). Since the start in 1998, the ÖVB partnership has built social capital in terms of trust, common norms, reciprocity and exchange shared amongst its members. The project is inspired by the Model Forest-concept, eco-parks and the global network of Biosphere Reserves, and has developed to the extent that it is now considered a biosphere candidate. Both the Model Forest and Biosphere Reserve concepts emphasize cooperation at all levels and areas that meet all these criteria can be included in a worldwide network, with opportunities to impact not just the local landscape, but also global processes.

During a ten-year period a collaborative model for sustainable landscape has been developed within the project from a starting point characterized by intractable conflicts between government authorities, environmental groups and landowners. The area is of great natural value, and is considered as being important for recreation and tourism. The area is also characterized by having a large number of landowners with small holdings, with a number of authorities and environmental organizations interested in the area. Needless to say, there was a great need to reach some type of accord between these varying interests. A prerequisite for turning these conflicts into constructive collaboration and dialogue was the creation of *common arenas* where the different actors could meet. A project group consisting of representative from the county administrative board, the municipality, the Forest Agency, forest owners and farmers' associations and local and national environmental interest organizations was created. The project which started as a top-down initiative due to the conflicts and lack of trust between forest owners, public authorities and local NGOs, has now, after 10 years, been established as a permanent forum and arena for collaboration, consultation and development of the natural assets and forest products and services. The project group has no formal hierarchical structure, having horizontal as well as vertical collaborations where the ultimate goal is finding *the 'social key habitats'*, i.e. functioning social norms and bonds within the community and between different stakeholders/actors and organizations, drawing on the components of social resilience: relations of trust; reciprocity and exchange; common norms, rules and sanctions; and connectedness (Käll 2006).

The ÖVB-project could best be described as a successful *adhococracy*, a less hierarchical organization facilitating collaboration and adaptation due to the freer positions of individuals within the organizations where the management and governance include components of resilience such as knowledge building and bridging, trust building, conflict resolution mechanisms, and highly developed collaboration. The project indicates high social capital among the members of the group and an ability of self-organization. What is distinctive for this whole process is the development of a new way of thinking about how the landscape can be developed for social and economic benefit with strong local support, for being an arena for research and teaching as well as for preserving ecological/biological diversity. This is an example of *multi-functionality*, where several different purposes collaborate and strengthen each other. Here we see an emphasis on bringing new actors into the policy formulation, interpretation and implementation arena, the development of new networks, the role of information and debate in producing 'enlightened self-interest' and common frames of understanding in line with the views of the New Public Service. Creating an arena for cooperation and collaboration - *where the arena in itself is the tool* - has made it possible for the public authorities to make use of various forms of flexible instruments: inventories making the base for guidelines and programs, mutually agreed upon by all parties, paving the way for voluntary agreements, certification and other soft instruments.

A recent study on resilience theory carried out in the ÖVB-area, showed that some of the most significant factors behind the success of the project are similar to important aspects that constitute *social resilience* (Käll 2006):

1) *Knowledge building and knowledge bridging* are crucial mechanisms for a management system to be truly adaptive, serve as a bridge to action, and to be self-organizing: to facilitate and learn from experiences of change in order to develop innovations (Westley 1995). Several

activities in ÖVB are in line with knowledge building and bridging: informative meetings concerning the cultural and natural landscape, interviews with local landowners concerning looping trees, an exhibition at the local museum, and an ‘eco-bus’ for children in school to get familiar with the ÖVB-area.

2) *Collaboration* is an important mechanism because it leads to decisions with higher value, as they are more likely to be implemented if agreed upon by all actors. Collaboration also makes the social system better prepared for future challenges and changes (Wondolleck and Yaffee 2002). This results from the projects being designed as an ad hoc project, and by the lack of formal hierarchical structure in the project group enabling the opinions of the members to have the same weight. There are horizontal collaboration at the local level between the forest owners and farmers’ associations, and at the regional level between the county administrative board and the Forest Agency. There is also a high degree of vertical networking within the project which has resulted in a high rate of implemented decisions.

3) Building knowledge and bridges to action requires well-established and functioning common social bonds and norms to create shared values. This is referred to as *social capital*. Social capital can mainly be determined by four main features: reciprocity and exchange; relations of trust; common rules, norms and sanctions; and connectedness (Pretty 2003). Social capital lowers the transaction cost and help increase individual responsibility within a group (Wondolleck and Yaffee 2002). Key-persons are important in a social network as they encourage communication and trust-building which are necessary for a good collaboration between the stakeholders. The ÖVB-project was from the start a top-down initiative by the Forest Agency and the county administrative board and that was due to conflicts and lack of trust between the forest owners and the local NGOs. Today the project group has no hierarchical structure, no legally binding rules or sanctions: it all comes down to a ‘win-win’ solution, or if no agreement can be reached, a ‘lose-lose’ situation. By using the strategy of ‘all cards on the table’ a trust-building process is created by which informal decisions are followed and implemented.

4) Last, *adaptability* is crucial for having the ability to interpret feedbacks from the system and to understand changes within management. Through adaptive governance the social system can build up capacity to change, transform and adapt to the ecosystem (Folke 2005). The ÖVB-project was originally set up because there was a change in biodiversity, precipitating conflicts. Here, the social system of ÖVB was self-organized and helped resolve the problem. Today, trust-building continues, but the ability to adapt is limited by the constant structure of stakeholders. The project group is now planning to involve more people in the project, such as local entrepreneurs and locals from outside the county borders to encourage new ideas to promote local entrepreneurship and innovations.

According to the case study the management regime and governance has proven to be social resilient due to the social capital built up in terms of trust, common norms, reciprocity, and exchange. The current knowledge building and bridging secures the management regime, but if the trust were to erode the project would be likely to fall apart because of the lack of formal decisions. Decisive for the future of the project is that the present structure expands and changes to secure future adaptability. This could be achieved by allowing more stakeholders and organizations into the project- and reference groups, in order to widen the scope and encourage new projects. The extended scope of the project towards a development of new forestry practices such as locally-based nature-oriented recreation and tourism, may thus imply that owner groups

will need more support and education in new and innovative forms. A possible complement to already existing network-cooperation might be to explore peer-to-peer learning strategies, where forest owners learn from each other, in the ÖVB-approach.

FINAL REMARKS

The increased attention and demand among lawmakers and policy practitioners for new types of legitimate authority, has mainly been focused on institutionalized power recognized by those regulated by them. The authority found in systems of *government* characterized by the domination of hierarchy and monopoly for rule setters (state and public actors) is contradicted by the authority in systems of *governance* which rests upon multiple authorities – not necessarily public. New regulatory forms comprising networks, non-state actors and organizations, have come to challenge more traditional hierarchical forms of regulation. This has led to a ‘new’ regulatory mode characterized as a ‘soft law’ framework defined in terms of non-binding rules such as voluntary agreements, recommendations, guidelines, codes of conduct, certification etc. Stakeholder participation, partnership agreements and networks can thus be cornerstones in building more effective policy frameworks for environmental policy-making and good governance. Indeed, the position of local and regional actors has been strengthened – a process that is of utmost importance for *small-scale forestry*. This seems to be connected with the shifting of responsibilities from the public to the private sector, leading to increased networking across public and private actors. In response to these changes national governments have introduced new policy instruments that involve a larger role for local communities and other actors.

The choice between hard law and soft law is though not a binary one: various forms of soft regulation in the environmental arena can work as a functional *complement or alternative* to legislation, especially when it comes to complex environmental questions that entail a great deal of uncertainty, and where there is no scientific consensus. Ultimately what is aimed at is ‘smart’ regulation via the use of various forms of flexible instruments in a context where a greater number of stakeholders are involved. Thus the role of regulatory authorities moves towards becoming a facilitator, or an engine that as a partner promotes collaborative structures and cooperation. This progressive transformation of the role and values of public administration - from rowing to steering to *servicing* and producing ‘enlightened self-interest’ and common frames of understanding - is emphasized by the advocates of *the New Public Service* perspective. They argue for a model based on citizenship, democracy, and service in the public interest as an alternative to the now dominant models based on economic theory and self-interest. The New Public Service seeks shared values and common interests through widespread dialogue and citizen engagement - by bringing people ‘to the table’. In this view, enhanced public dialogue is required in order to reinvigorate the public bureaucracy and restore a sense of legitimacy to the field of public administration.

Many of the guiding ideas and mechanisms that *governance* uses are however *normative* in the sense that they describe an ideal - as well as an empirical reality: to get the ideal to work in reality is probably the greatest challenge for the governance perspective. An example of a successful application of ‘soft’ regulation and innovative forms of steering in line with the ideas of the New Public Service perspective, is the Östra Vätterbranterna (ÖVB) project area in the southern part of Sweden. The ÖVB partnership has developed from a starting point characterized

by intractable conflicts to a permanent forum and arena for collaboration, consultation and development of the natural assets and forest products and services. A prerequisite for turning these conflicts into constructive collaboration and dialogue was the creation of a *common arena* where different actors could meet: *the arena in itself was the tool*. By establishing a project group with no formal hierarchical structure the project has functioned as an *adhocracy*, an organization facilitating collaboration and adaptation due to the freer positions of individuals within the organizations where the management and governance include components of resilience such as knowledge building and bridging, trust building, conflict mechanisms, and highly developed collaboration. The ultimate goal is finding *the 'social key habitats'*, i.e. functioning social norms and bonds within the community and between different stakeholders/actors and organizations. I argue that this is the most conducive form for further growth and development of diversified forest uses.

Securing sustainable development in rural areas where people can cooperate in creative and participatory processes, calls for vision and capacities to impact changes in the landscape. New forms of cooperation are under development, and many of these are moving towards 'softer' more inclusive forms of regulation that open up for the participation of a greater number of actors. Developing strategies where local actors feel freedom and security in their use of natural resources is a prerequisite for developing partnerships and arenas for sustainable forestry from a landscape perspective.

Comprehensive and important questions for further research to explore are whether soft law should function as a complement, or supplement to, the traditional legal order (or even be considered as 'pre-law' or emergent hard law), or if it should be seen as part of a network-based, less hierarchical decision-making process.

REFERENCES

- Abbott, A. and Snidal, D. 2000. Hard and Soft Law in International Governance. *International Organizations* 54:421-456.
- Ahrne, G. Brunsson, N. 2004. *Regelexplosionen*. Handelshögskolan i Stockholm. Stockholm: EFI.
- Appelstrand, M. 2002. Participation and societal values: the challenge for lawmakers and policy practitioners. *Forest Policy and Economics*, Vol 4 (4):281-290. Elsevier, Amsterdam.
- Appelstrand, M. 2007. *Miljömålet i skogsbruket – frivillighet och styrning*. Dissertation thesis. Lund Studies in Sociology of Law. Lund: Lund University.
- Asp, T. and Jonsson, P. 2002. Projekt Östra Vätterbranterna. Rapport 1. Länsstyrelsen i Jönköpings län.
- Beck Jörgensen, T. B. och Vrangbaeck, K. 2004. *Det offentlige styrningsunivers. Fra government till governance?* Danska magtutredningen
- Boström, M. 2004. En mångfald av parter: nya regler i skogen. I Ahrne, G. och Brunsson, N. (red.) *Regelexplosionen*. EFI. Handelshögskolan. Stockholm.
- Cashore, B. et al. 2005. Private or self-regulation? A comparative study of forest certification choices in Canada, the United States and Germany. *Forest Policy and Economics* 7(2005) 53-69.
- Denhardt, J.D and Denhardt, R.B. 2003. *The New Public Service: Serving, not Steering*. New York: M. E. Sharpe.

- Eckerberg, K. and Joas, M. 2004. Multi-Level Governance: a concept under stress? *Local Environment*, 8 (5): 405-412.
- Eckerberg, K. 1987. *Environmental Protection in Swedish Forestry. A Study of the Implementation Process*. Diss. Thesis.. Research Report 87:12. Dept.of Political Science, Umeå University.
- Eising, R. and Kohler-Koch, B. 2000. Introduction: Network governance in the European Union. In B. Kohler-Koch & R. Eising (eds.) *The transformation of governance in the European Union*. London/New York: Routledge.
- Folke, C. 2006. Resilience: The Emergence of a perspective for socio-ecological systems analyses. *Global Environmental Change* 16:253-267.
- Gunningham, N and Grabosky, P. 1998. *Smart Regulation. Designing environmental policy*. New York: Oxford University Press.
- Gunningham, N. and Sinclair, D. 2002. *Leaders & Laggards. Next-generation environmental regulation*. Midsomer Norton: Greenleaf Publishing.
- Gunningham, N., Kagan, R.A., and Thornton, D. 2003. *Shades of Green. Business, regulation, and environment*. Stanford: Stanford University Press.
- Hirst, P. 2000. Democracy and governance. In: Pierre, J. (ed.) *Debating governance: Authority, steering and democracy*. Oxford: Oxford University Press.
- Jonsson, P. 2004. *Resultat och erfarenheter från projekt Östra Vätterbranterna*. Meddelande nr 2004:34. Länsstyrelsen Jönköping.
- Kettl, D. 2000. *The Global Public Management Revolution*. Washington DC: Brookings Institution
- Kjaer, A.M. 2004. *Governance*. Cambridge: Polity Press.
- Kubeczko, K., Weiss, G., Rametsteiner, E. 2006. The role of sectoral and regional innovation systems in supporting innovations in forestry. *Forest Policy and Economics* 8(7): 704-715.
- Käll, K. 2006. *Östra Vätterbranterna. Resilience in Social-ecological systems*. Working-paper. Dept. Of Systems Ecology, Stockholm University.
- Lunnan, A. et al. 2006. Entrepreneurial attitudes and probability for start-ups – an investigation of Norwegian non-industrial private forest owners. *Forest Policy and Economics*, Vol 8 (2006) pp. 683-690. Elsevier, Amsterdam.
- Moffet, J. and Bregha, F. 1999. An overview of Issues with Respect to Voluntary Environmental Agreements. *Journal of Environmental Law and Practice* 8.1 pp. 63-94.
- Mayntz, R. 2003. *From government to governance: Political steering in modern societies*. Paper presented at the Summer Academy on IPP: Wuerzburg, Sept. 7-11 2003.
- Michanek, G. and Zetterberg, C. 2008. *Den svenska miljörätten*. Uppsala: Iustus förlag.
- Mörth, U. (ed.) 2004. *Soft Law in Governace and Regulation. An Interdisciplinary Analysis*. Cheltenham: Edward Elgar Publishing.
- Niskanen, A. et al. 2007. Barriers and Opportunities for the Development of Small-scale Forest Enterprises in Europe. *Small-scale Forestry* (2007) 6:331-345.
- Osborne, D. and Gaebler, T. 1992. *Reinventing government: how the entrepreneurial spirit is transforming the public sector*. Addison-Wesley, Reading, Mass.

- Pierre, J. 2000. Introduction: understanding governance. In: J. Pierre (ed.) *Debating Governance, Authority, Steering and Democracy*. Oxford: Oxford University Press.
- Pierre, J. and Peters, B.G. 2000. *Governance, politics and the state*. London: Macmillan Press.
- Pollitt, C. and Bouckaert, G. 2000. *Public Management Reform. A Comparative Analysis*. Oxford: Oxford University Press.
- Premfors, R. 1998. Den komplexa staten. I Ahrne, G. (red.) *Stater som organisationer*. Stockholm: Nerenius & Santérius förlag.
- Pretty, J. 2003. Social capital and the collective management of resources. *Science* 302:1912-1914.
- Rametsteiner, E. et al. 2006. Innovation and innovation policy in forestry: linking innovation process with systems models. *Forest Policy and Economics* 8(7):691-703.
- Rhodes, R.A.W. 2000. Governance and public administration. In: Pierre, J. (ed.) *Debating governance: Authority, steering, and democracy*. Oxford: Oxford University Press.
- Snyder, F. 1993. The Effectiveness of European Community Law: Institutions, Processes, Tools and Techniques. *The Modern Law Review*, 56, January, pp. 19-54.
- Stjernquist, P. 1973. *Laws in the Forests: A Study of Public Direction of Swedish Private Forestry*. Lund: Kungl. Humanistiska Vetenskapssamfundet LXIX.
- Sundström, G. 2005. Målstyrningen drar åt skogen. Om government och governance i svensk skogspolitik. Score Rapportserie 2005:6. Stockholm.
- Sørensen, E. 2004. *Offentlig ledelse som meta-styrning av netværk*. Centre for Democratic Network Governance. Working Paper 2004:3.
- Tarschys, D. 2004. Sektorisering och konsolidering. Två utvecklingstendenser i svensk samhällsförvaltning. I *Sektorisering inom offentlig förvaltning*. s. 105-143. Statskontoret.
- Van Kersbergen, K. and Van Waarden, F. 2004. Governance as a bridge between disciplines: Crossdisciplinary inspiration regarding shifts in governance and problems of governability, accountability and legitimacy. *European Journal of Political Research*(43)2/2004pp.143-172.
- Weiss, G. et al. 2007. Innovation Processes in Forest-related Recreation Services: The Role of Public and Private Resources in Different Institutional Backgrounds. *Small-scale Forestry* (2007) 6:423-442.
- Westley, F. 1995. Governing design: the management of social systems and ecosystems management. In: Gunderson, L., Hollings, C. S., and Light, S. (eds.) *Barriers and Bridges to the Renewal of Ecosystems and Institutions*. New York: Colombia University Press.
- Wondolleck, J. M., and Yaffee, S. L. 2002. *Making Collaboration work: lessons from innovation in natural resource management*. Washington DC: Islands Press.
- Zielonka, J. 2001. How New Enlarged Borders will Reshape the European Union. *Journal of Common Market Studies*. 39(3):507-536.
- Zito, A. et al. 2000. Democratic Governance Beyond the Nation-State – The EU and Other International Institutions. *European Journal of International Relations* 6(2): 182-222.

FARMER WOODLOTS DEVELOPMENT IN SRI LANKA: GAINS, LOSSES AND REMEDIES

Mangala De Zoysa¹ and Makoto Inoue²

Abstract--Shifting cultivation was a traditional form of agroforestry practiced in Sri Lanka where forest and crops alternate in a temporal sequence. During the past several decades shifting cultivation was perceived as primitive, unproductive and exploitative system causing environmental degradation. The national forest policy was amended with community forestry in 1980s and established farmer woodlots (FWLs) as a major component of community forestry development projects. The FWL was considered as a promising agroforestry model and consensus-based approach to rehabilitate the degraded lands under shifting cultivation. This paper reviews the gains and losses of the transformation of forest lands from shifting cultivation to FWLs, and proposes possible remedies to restate the foregone-benefits. Major economic and social benefits experienced through the transformation are critically analyzed. Customary rights enjoyed by farmers for their traditional shifting cultivation lands have been reinstated by tenure arrangements of farmer woodlots. The FWLs presently provide valuable timber with ample economic status for the farmers by virtue of returns from commercial tree plantings as conservation based, market oriented production system. However, the FWLs have begun to threaten the sustainability of forest livelihoods. The farmers in a village have lost their traditional forest lands which provided them with variety of domestic needs. Presently, farmers have to search alternative small-scale forest common in addition to the FWLs within the village to satisfy their foregone benefits. Substantial extent of government forest lands in the villages would be sustainably managed as forest commons under the community forest governance.

BACKGROUND

Shifting cultivation is accepted as an early stage of agricultural evolution and still widely practiced in different parts of Sri Lanka. The shifting cultivation is characterized by a rotation of fields rather than of crops, in forest lands clearing by means of slash-and-burn. Managing socially accepted trees and tree-based agricultural systems under shifting cultivation were the survival strategy of the traditional village communities. They have managed shifting cultivation as means of meeting community needs, conservation of biodiversity, land management and development, and timber production (Wickramasinghe, 1997). Farms had no permanent boundaries under traditional shifting cultivation. The fields of each farm family operated scattered in different parts of the forest land under the jurisdiction of the community. Crown Land Encroachment Ordinance in Sri Lanka (then Ceylon) imposed by British in 1840, turned many shifting cultivation lands into crown property (Perera, 2001). Shortened fallow period of

¹ University of Ruhuna, Sri Lanka. Email: mangalaxyz@yahoo.com

² The University of Tokyo, Japan. Email: mkinoue@fr.a.u-tokyo.ac.jp

remained shifting cultivation due to the population growth and shrinking available forest resulted with severe land degradation. Even though the government regularized shifting cultivation issuing of cultivation permits, large tracts of forest were lost in the past due to uncontrolled shifting cultivation. The National Forest Policy (NFP) in 1980 was the start-up of formal community involvement in forestry management activities in Sri Lanka.

Community Forestry Project (CFP) introduced in 1982 and Participatory Forest Project (PFP) launched in 1992 became successful attempts for community forest management. Establishment of FWLs was a model developed by CFP and PFP under village forestry strategy. The farmers were expected to plant timber trees together with their agricultural crops at the establishments of FWLs. FWLs are expected to provide food, timber and income, while providing environmental services. Blocks of government lands ranging 0.2 ~ 1.0 ha depending on the agro-ecological zone and district were provided to farmers on a long-term lease of 25 years. The projects planned to establish FWLs in 5,500 ha with multipurpose tree species (Nanayakkara, 2001). Almost after about 25 year, the farmers have a mix feeling about success of FWL scheme implemented under two community forestry projects in Sri Lanka. Therefore, the main aims of the paper are: to analyze the benefits gained from forest lands transforming shifting cultivation to farmer woodlots; to ascertain the losses encountered in farmer woodlots; and to discuss possible remedial measures to restate foregone benefits through alternative village forest common. The paper reviews the current state of knowledge presented in literature and creates an understanding of gains and losses, and discuss possible remedies.

GAINS OF THE FWLs SCHEMES COMPARED WITH THE SHIFTING CULTIVATION

Economic

Farmer Woodlots (FWLs) was designed for farmers to grow trees on shifting cultivation lands, using an agroforestry approach for promoting a wood supply and improving their livelihoods. They were provided with the lands on lease agreements in return for undertaking sustainable forest management (Kallesoe and De Alvis, 2004). They were encouraged to plant cash / field crops during the first 3-4 years as an agroforestry intercropping system (Sathurusinghe 1998). The farmers have harvested agricultural crop during first 4 years periods. Further they were provided with food ration for the establishment and maintenance of plantations at the initial stage (FAO, 1997). The FWLs models were based on replanting shifting cultivation lands with predominant wood tree species. The model in the dry zone was based on teak (*Tectona grandis*) only or teak / margosa (*Azadirachta indica*) mixed stand. The model in the Intermediate zone was the teak only stands while in the wet zone, eucalyptus or teak models were used (ADB, 2003). FWLs have contributed to the economic value for farmers because of the greater yield of timber from their forest trees. The farmers have already earned average Rs. 24,500 (US\$ 245) and Rs. 66,000 (US\$ 660) per hectare income from the thinning of trees in their FWLs in 8 and 15 years respectively. Although the final yield of timber produced at FWLs has not been harvested, they expect a large sum of money at the end of 25 years lease agreement. By 1992, 1861 farmers had developed 420 ha of lands as FWLs under CFP. The farmers have established 9,678 ha of FWLs under PFP which is much higher than the appraisal target (ADB 2003).

Social

Usufruct rights enjoyed by farmers for their traditional shifting cultivation lands in Sri Lanka have been reinstated by tenure arrangements of FWLs. The success of FWLs could be attributed

to flexibility of farmers to accept land- and tree-tenure agreements. The main positive factor of the FWLs program under CFP in 1982 was that the farmers preferred individual blocks of land allocated to each family to enable them to reap undivided benefits. The PFP in 1993 also released lands for farmers to grow trees as FWLs and manage them for their own benefit. The legal provisions for leasehold forestry, an effective form of partnerships was included in the amendment to the Forest Ordinance in 1995 (Nanayakkara, 2001). Forest Department started establishing partnerships with farmers in raising FWLs on a long-term lease basis since the 1980s. The department provided seedlings of forest and crop species and technical advice to the farmers free of charge. Deviating from the traditional reforestation model, PFP in 1993 consulted communities during the planning process of the FWLs program concerning the site selection, species selection and planting design. They were provided with seedlings, advice and training on technical aspects and expected to manage the FWLs in their individual capacity (FAO, 1998). Farmers have the rights to harvest the trees upon maturity.

LOSSES OF THE FWL SCHEMES COMPARED WITH THE SHIFTING CULTIVATION

Disturbances on indigenous institutional structure

Indigenous knowledge associated with the forestry and agricultural practices survived in Sri Lanka due to the unique institutional system that supported it. According to traditional practice, shifting cultivation was a community activity. Individual decisions had to fall in line with communal decisions (Upawansa. and Wagachchi, Undated). Usually in traditional shifting cultivation, 10-12 families cleared forest area of 8 ~ 10 hectares, and cultivate as a single site (Perera, 2001). Indigenous village institutions usually activated when there was an important issue to be solved by the village (Nurse and Hitinayake, 2000). They often involved voluntarily in fire suppression activities of the village forests and chasing wild elephants from the village forest. These village institutions are poorly defined under the management of FWLs. The management pattern of the FWLs has created the indigenous institutional structures latent, weak or dysfunctional. Although the PFP recruited and trained 268 motivators to undertake social mobilization and liaison between communities and FD, some of the FWLs are poorly maintained due to lack of motivators. Some parts of the FWLs initiated under the CFP in Sri Lanka had been abandoned by the farmers by 1995. The FWLs schemes were incompatible with their traditional farming systems managed with their indigenous knowledge and experiences (Wickramasinghe 1997).

Dilution of customary rights

Customary management systems prevailed under traditional shifting cultivation in Sri Lanka composed of more appropriate rules according to local social-cultural and ecological settings. Traditional villages in Sri Lanka were established on sites for good ecological considerations. It has been revealed that the communities in the village enjoyed the extra-legal rights of access and use of natural resources, including shifting cultivation lands (Nurse and Hitinayake, 2000). The forest lands under shifting cultivation used to be a common ownership but crops under individual ownership. Grazing is undertaken on shifting cultivation lands during the fallow season as free range systems. They accumulate, use, or re-invest wealth when it has been produced. Under traditional landscape, communities also have access to paddy lands and common pool forest resources to complement shifting cultivations. In the traditional land use system village forest were used for rain-fed shifting cultivation and for the collection of forest products required for the domestic use. The farmers who had no access to tank water for agricultural practices had to

rely their livelihood entirely on rain-fed shifting cultivation, other forest uses and grazing. Customary rights enjoyed by farmers for their traditional shifting cultivation lands have been diluted with the individual lease tenure arrangements of FWLs. The government-led leased land tenure policy for FWLs limited the farmers' right over the land. On the other hand the insecure land tenure without any legal assurance and the history of mistrust between farmers and the Forest Department has hampered the FWL development program to some extent (Carter et al. 1994).

Disappearance of multiple outputs

The forested area used for shifting cultivation in Sri Lanka played an important role by providing the farmers with wide variety of products including wild food, timber and non-timber forest products (Nurse and Hitinayake, 2000). Secondary forests regenerated after the shifting cultivation provide construction timber, small poles, fuelwood, bush meat, honey, medicinal plants, yams and other food (Perera, 2001). The farmers were subsistence collectors who rely on non-timber forest products to provide a significant part of their, food, medicine, or shelter. For over two thousand years, the traditional healthcare system “Ayurveda” in Sri Lanka is based on medicinal plants that are collected from the wild around to treat illnesses and deceases (Kallesoe and De Alvis, 2004). The tenure rights alone is not enough to off-set the illegal encroachment and logging until the farmers generate continuous flow of direct values in the form of timber and other forest products from FWLs. The areas with FWLs are short of wood and other forest products for immediate local needs. The increase in village population, greater demands for fuelwood and desire to extend crop production lead to cutting down forests. Product extraction through firewood and other forest products collection and animal grazing in reserved forest lands are influenced by lack of common forest land in villages after establishment of FWLs. The impact of the FWLs on supply of non-timber forest products is negative specially the supply of medicinal plants and fruits with the growth of forest trees. Many medicinal plants are under threat from over-harvesting and converting village scrubs into FWLs (Kallesoe and De Alvis, 2004).

Off-set food security and income

Traditional farmers in Sri Lanka practiced shifting cultivation to earn income as well as to meet their subsistence food requirements. Most of the villages where the farmers practiced shifting cultivation were characterized by lack of alternative income sources and somewhat isolated from urban based incomes. These farmers collected non-timber forest products from the forest lands which they used for shifting cultivation during the fallow season, to supplement their overall food and income supply (Nurse and Hitinayake, 2000). The secondary forests help to bridge seasonal gaps in farmers' livelihoods (Perera, 2001). The total banning of shifting cultivation has caused considerable income losses of farmers' and affected their food security. Annual income loss due to banning of shifting cultivation and reduced harvesting of non-timber forest products is estimated around US\$ 150 (Annual per capita income in Sri Lanka is US \$ 1,000) per household (Wickramasinghe, et.al, 2006). The success of FWLs during the early stages could be attributed to increased incomes generated through inter-cultivation of agricultural crops. A trend analysis has been revealed that the farmers prefer to obtain regular income instead of having to wait for longer periods or wait till the 25-year period to obtain the income from final harvest of trees in FWLs (ADB 2003). The lack of continuous income for farmers after three year has become a major weakness of the FWLs. They have disappointed about the FWLs a kind of forestry as a means of poverty alleviation (Nanayakkara, 2001). On the other hand, very limited

access and rights to government forest has become a threat to income generation and food security of the farmers. The widespread rural poverty and landlessness in Sri Lanka still continue to a considerable level of forest encroachment and conversion at the current rate of 1.5% a year (www.cmsdata.iucn.org/downloads/sri_lanka.pdf access February, 2009).

POLICY RECOMMENDATION: RENEWABLE MEASURES

Establishment of Forest Commons

The responsibility and authority for managing much of the forest land in Sri Lanka remains under government ownership (http://cmsdata.iucn.org/downloads/sri_lanka.pdf access February, 2009). However, “Joint forest management” and “leasehold forestry”, have been accepted by Sri Lanka in the national Forestry Policy in 1995 (Forestry Planning Unit, 1995). Forestry institutional reform started in 2000 is making attempts for people-centered effective management of forest lands for multiple-use production mainly for the benefit of local people (Institute of Policy Studies, 2004). Small-scale forest common property systems are clearly needed to make remedies for the crisis created in village by the introduction of FWLs. A little extent of village forest could be used as a transitional step to opening up land that should rationally be brought under common use by farmers. Secondary forests situated adjacent to natural reserved forests buffer could be managed under common property regime as forest commons. Farmers could extract some fuelwood, edible fruits, medicinal plants and other forest product for subsistence use. It is anticipated new and vigorous growth of trees through natural regeneration with little cost may occur in these forest commons. Forest commons are known for their unique contributions to farmers and cultural services. Forest common offers a great opportunity to preserve commons cultural heritage and take best advantage of available knowledge (Roberto and Marisa 2007). Forest common opens to all local interests and is thus an effective instrument for finding generally accepted compromises (Merlo, 1995).

Development of multiple-use forests

Managing multiple-use forests is more accepted in forest commons than in government or private forest estates. The Forestry Sector Master Plan (FSMP) of Sri Lanka in 1995 had also emphasized the multiple-use management of natural forests as major components of its implementation program (FAO 2000). The Small Grants Program for Operations to Promote Tropical Forests (SGP PTF) initiated in 2004 to promote small-scale multiple use forests by the buffer-zone communities in selected areas of the government forest (EU – UNDP 2004). The management of multiple-use forest expected to deliver a wide range of products and services on a sustainable basis to meet the needs of farmers. Forest commons allow economies of scale for effective sustainable multipurpose management compared to the FWLs which are generally rather small. According to (Merlo, 1995), forest commons are economically and technically sound and able to respond efficiently particularly for sustaining yield to sustainable multiple-use forestry. Forest common should be oriented not only toward meeting subsistence needs but also help user groups exercise a much broader range of forest management options. It will provide a multiplicity of non-timber forest products for commercial, industrial or subsistence use (Sah and Dutta, Undated). Non-timber forest products would constitute major sources of not only income but also employment for local villagers. Foods, medicines, materials for handicrafts, spices, resins, gums, and latexes can be extracted sustainably from the forest common ecosystem developed aiming at multipurpose. Multiple-use forest products from forest common offer scope

for innovative variations on forestry, agriculture and local industry while alleviating local pressures to over exploitation of natural forest.

Setting-up of collective institutional arrangements

Management of forest common will depend on the institutional structure governing resource allocation. Although the community management of natural forests in principle can be sustainable, often in practice over exploitation take place due to unsustainable management practices (Acharya, 2005). The non-private ownership of forests lands may leads to a "tragedy of the commons" that characterizes the absence of regulatory institutions leads to degenerative patterns of use and the gradual depletion of common property resources. Management of forest common would be at the heart of the community's activities and determined their social and economic needs. Collective institutional arrangement would be a best strategy with high social bonds between forest users, dependency on agriculture, and a market intervention. High levels of social cohesion consolidated by kinship would allow each household to take part in decision-making and implementation in collectively agreed time and space. The collective institutional arrangement should be a legally supported approach in forest common resource management. The common property forest resource could be managed for individual benefits while maintaining the collective principles of community forestry. Some forest products could be controlled and managed on an individual basis, whereas others should be controlled and managed by the group of local communities (Acharya, 2005). It has been recognized that the government institutions in Sri Lanka with very limited resources cannot protect the highly fragmented forests in the country. Hence, the SGP PTF is presently applying a forest management strategy somewhat similar to forest common. The strong commitment of buffer-zone communities and their active participation in management and decision making have become very essential to conserve and protect the natural forests (UNDP 2006).

Promotion of community forest governance

Although the National Forest Policy of Sri Lanka in 1995 emphasized community participation in forest management, effective governance with required policy and legal framework for devolving meaningful authority has yet to be put in place. The existing regulatory framework for forests is inconsistent and lacks clarity and difficult to reach consensus among stakeholders (http://cmsdata.iucn.org/downloads/sri_lanka.pdf access February, 2009). It could be observed that the illegal exploitation of forest products from village forest is common mainly because of the high demand without proper governance system. Hence, establishment of community forest governance for forest commons would be a timely strategy with local people in conserving their forests, managing forest enterprises, and actively shaping and monitoring policy. Community forest governance of management of forest common would balance the power and decision-making between government and forest communities; and develop relationships within the forest communities (De Zoysa and Fernando, 2004). Community forest governance has to be focus on bio-physical and cultural aspects and working rules of the rural setting (Ostrom *et al.* 1994). The management of forest common with good community governance will opens the space for local voices to be involved in planning and management of forest resources. Community forest governance enhance the capacity of forest dependent farmers to meaningfully participate, exercise their rights and represent their interests in forest related agenda setting and management decision-making (CIFOR, 2007). Under the local collaborative forest governance various stakeholders take interests in planning, organizing, leading and controlling of the local forest management process (Inoue 2004). Hence, many decisions of forest common management could

be taken by the forest dwellers, farmers and other stakeholders living around the forest. Community forest governance fosters accountability and transparency in management of forest commons with equitable relations among all the partners including government (Menzies, 2004). The recognition of community rights and improving community forest governance is politically feasible and also cost effective strategy for rural poverty alleviation in Sri Lanka (De Zoysa and Inoue 2007).

CONCLUSIONS AND POLICY IMPLICATIONS

The main economic benefits attributed to the transformation are the revitalization of forest lands degraded due to shifting cultivation; and production of valuable timber with ample economic status from those lands. FWLs scheme has reinstated the usufruct rights for forest lands the farmers had enjoyed in traditional shifting cultivation while promoting joint forest management. The losses encountered in the transformation have been identified as disturbances on indigenous institutional structures, dilution of customary rights, disappeared multiple outputs, and off-set food security and income. Establishment of forest commons, development of multiple-use forests, setting-up of collective institutional arrangement, and promotion of community forest governance are suggested as the possible remedial measures to restate foregone benefits.

REFERENCES

- Acharya, K. P. (2005), Private, Collective, and Centralized Institutional Arrangements for Managing Forest “Commons” in Nepa; *Mountain Research and Development* 25(3):269-277. 2005
- Asian Development Bank (ADB); (2003) Project performance audit report On the participatory forestry project (Loan 1183-SRI[Sf]) in Sri Lanka, ADB, Philippine.
- Carter, J., Connelly, S. and Wilson, N. (1994); Participatory forestry in Sri Lanka: Why so limited? Change on the horizon, Network Paper 17b, Rural Development Forestry Network, ODI, London
- Center for International Forestry Research (CIFOR) (2007), Forests and governance program. Update October 02, 2007 of CIFOR, Bogor, Indonesia
- Conklin, U.C. (1961), The study of shifting cultivation; *Current Anthropology*. Vol 2. No.I.
- De Zoysa, M. and Fernando, C. (2004) Promotion of corporate governance for Sustainable forest development in Sri Lanka. Proceedings: Ninth Annual Forestry and Environment Symposium of the Department of Forestry and Environment Science, University of Sri Jayawardenepura, Sri Lanka. 27 - 28 February 2004
- De Zoysa, M. and Inoue, M. (2007). “Community Forest Management in Sri Lanka: Concepts and Practices”. Proceedings of International Symposium on Forest Stewardship and Community Empowerment: Local Commons in Global Context. Kyoto International Community House, Japan, Date: Oct 11 ~ 12, 2007
- EU – UNDP (The European Commission, United Nations Development Program); (2004) Small Grants Program for Operations to Promote Tropical Forests (SGP PTF): Country Guideline Paper for Sri Lanka (2004 – 2007); Colombo, Sri Lanka
- FAO (1997), State of Forest Genetic Resources Conservation and Management in Sri Lanka; People and Forests - Community Forestry at FAO, FAO, Rome
- FAO (1998), Woodfuel in Sri Lanka - Production and marketing; FAO of The United Nations, Bangkok
- FAO (2000), FRA 2000 - Forest resources of Sri Lanka - Country report; FAO, Rome.

- Forestry Planning Unit (1995), Sri Lanka forestry sectors master plan: National forestry policy and executive summary; Ministry of Agriculture, Lands and Forestry, Sri Lanka.
- Inoue, M. (2004). "Present status of local communities in the CDM area: Significance of local collaborative forest governance". Okuda, T. and Matsumoto, Y. (eds.) Kyoto mechanism and the conservation of tropical forest ecosystem. Institute for Global Environmental Strategies-IGES, Japan.
- Institute of Policy Studies (2004), Land policy in Sri Lanka. In: Sri Lanka: state of the economy 2004. IPS, Colombo.
- Kallesoe, M. and De Alvis, D. (2004), Review of Developments of Environmental Services Markets in Sri Lanka; World Agroforestry Centre (ICRAF), Indonesia
- Menzies, N. K. (2004), Communities and Their Partners: Governance and Community-based Forest Management; Conservation & Society, 2, 2 (2004); SAGE Publications New Delhi
- Merlo, M. (1995), Common property forest management in northern Italy: a historical and socio-economic profile; FAO, Rome
- Nanayakkara, V.R. (2001), Regional study on forest policy and institutional reforms: Final report of the Sri Lanka case study; Asian Development Bank, Colombo, Sri Lanka
- Nurse, M. and Hitinayake, G. (2000), Change on the horizon: participatory forest management in Sri Lanka - recent experiences from the dry zone (<http://www.livelihoods.org/post/Docs/nurse1.rtf> web access Feb 2009).
- Ostrom, Elinor, R. Gardner, and J. Walker. (1994). Rules, Games, & Common-Pool Resources. Michigan: The University of Michigan Press.
- Perera, G. A. D. (2001), The secondary forest situation in Sri Lanka: A review; Journal of Tropical Forest Science 13(4), (2001): pp 768-785
- Roberto, S. and Marisa, C. (2007), A historical analysis of traditional common forest planning and management in Seneghe, Sardinia: Lessons for sustainable development; Forest ecology and management; vol. 249, pp. 116-124
- Sah, S. P and Dutta, I. C. (undated), Domestication and commercialization of non-timber forest products in Agroforestry systems: Product development, management and marketing; Non-wood forest products 9; World Agroforestry Centre
- Sathurusinghe, S .A. (1998), Community participation in the production of fuelwood; in FAO (1998) Woodfuel in Sri Lanka - Production and marketing; FAO of The United Nations, Bangkok
- UNDP (2006), Small Grants Program for Operations to Promote Tropical Forests (SGP PTF) Sri Lanka, Annual Report July-November 2006, UNDP, Sri Lanka
- Upawansa, G. k. and Wagachchi, R. (Undated), Activating All Powers in Sri Lanka Agriculture; Nawalapitiya, Sri Lanka
- Wickramasinghe, A. (1997), Women and Social Forestry in Sri Lanka; ENERGIA News Issue 2, April 1997
- Wickramasinghe, K., Steele, P. and Senaratne, A. (2006), Impact of forest conservation on household economy and poverty: Case of Knuckles National Wilderness Heritage (NWH) of Sri Lanka; Institute of Policy Studies, Colombo, Sri Lanka

BACKYARD WOODLOTS: LARGE SCALE EDUCATION FOR SMALL ACREAGES

Adam K. Downing¹, Jonathan Kays², and James Finley³

Abstract--Land parcelization in the Eastern United States is resulting in more landowners and smaller holdings. These small acre properties are increasingly important to the environmental health of natural systems. Seventy-three percent of Virginia's privately owned forestland is in ownerships of 10 acres or less, yet little assistance has been available to them. Additionally, we find most small acre owners are first-time landowners with little knowledge of natural systems. There is general agreement that planning and professional assistance lead to better forest stewardship; however, smaller acreage owners are even less likely than larger acreage owners to have written plans or seek assistance.

Locally initiated educational programming using a self-guided planning tool specific to small acreage owners has ushered hundreds individuals, families and Extension Volunteers through the planning process and resulted in high rates of written plan completion (average of 80%). According to exit and follow-up evaluations, most participants have implemented one or more practices based on their self-designed plan to improve and/or expand natural areas on their property. The program materials and design are an effective tool to excite, encourage, and affect stewardship on small acreages. Lessons learned from these interactions with landowners are allowing us to fine-tune outreach methods for this underserved and unique audience.

A parallel issue surrounding small acreage ownerships is the lack of service providers. While some landowners want and are willing to pay for services, related industries and service providers are slow to respond. The work with small acreage landowners is leading to programs to create outreach efforts in the Mid-Atlantic area to potential services providers.

INTRODUCTION

Today's most underserved forest landowner audience represents a majority. Small acreage forest owners are the majority of owners in the United States, especially in the Northeast and Southeast Regions. Landowners with less than 10 acres of forest represent 59% of the private forest landowners in the Eastern United States (Butler 2008). While the overall acreage of this audience is still relatively small (8%), they represent a growing underserved audience that is potentially a

¹Forestry & Natural Resources, Virginia Cooperative Extension, Northern District, Madison, VA 22727, 540-948-6881 adowning@vt.edu

²Forestry, Maryland Cooperative Extension, Western Maryland Research & Education Center, Keedysville, MD 21756, 301-432-2767 jkays@umd.edu

³The Pennsylvania State University, School of Forest Resources, University Park, PA 16802, 814-863-0402 fj4@psu.edu

significant political base to support forestry programs (Eagan & Luloff 2000, Hull *et al.* 2004). At the rural/urban interface the percentage of land held in small ownerships is significant. A recent study in Pennsylvania found 54% of the forestland in Berks County near Philadelphia was in ownerships smaller than 10 acres. Using statewide average ownership sizes previously estimated that Berks County had 9,400 owners, newer more precise estimates suggests nearly 27,000 forest owners in this urbanizing county (Metcalf *et al.* unpublished).

Traditionally, Natural Resource Professionals have stood on the sidelines watching as Private Forest Landowner (PFL) characteristics have gradually but drastically changed in ownership size and ownership objectives. We have a “new” type of landowner and new resource challenges.

The “new” landowner

Most forestland in the United States is held by Private Forest Landowners (PFLs). In the 17 southern states, for example, 59% of the 215 million acres of forestland is in PFL ownership (Butler 2008). Historically, these private forests have met most of society’s fiber needs. However, as our nation’s population has become increasingly affluent and older, many people have chosen to follow the American Dream of land ownership. Through this process, the finite supply of land is under increasing pressure and we find parcelization is rampant.

In the Southern Region, for example, the average forested tract size in 1978 was 45 acres and by 1994 the average dropped to 38 acres (Birch 1996). Over the next 10 years, it dropped another 10 acres. In a 2004 survey by Butler (2008), the average private forest ownership size was 28 acres in the Southern Region.

In general, small acreage landowners compared to larger landowners cite ecological and amenity values as ownership objectives more frequently. This differs little from the common ownership objectives of forest owners nationally, which are aesthetics, privacy, and family legacy. A major difference emerges when those who harvest firewood are excluded, the less forestland owned, the less likely an owner will harvest trees for timber (Butler 2008). This reinforces the contention that education for smaller acre owners should focus less on timber production and extraction and more on alternative values.

Kendra and Hull (2005) observed that new, small acre, forest owners in Virginia were most motivated by lifestyle concerns such as living simply, near nature and escaping urban stress. They have interests in growing their own food and recreating on their land. They express less interest in financial considerations when deciding what to do with their property. Yet, they are not necessarily preservationist desiring to leave the land “pristine.” For example, management tools such as herbicides, tree pruning, and harvesting are options these landowners would consider using to improve wildlife habitat, forest health, and scenic views. Kendra and Hull (2005) found that landowners cite many reasons for not managing their land, such as, they never thought about it, time and money limitations, parcel size, and lack of knowledge. Many of these are addressed through information, demonstration, consulting, and outreach programs.

Clearly, segments of the new forest owner generation offer challenges and opportunities for resource managers and educators. While these individuals most likely tend to look inside their boundaries, the decisions they make have ecological, economic, and social impacts across the landscape. In this regard, resource professionals should recognize a role interacting with this clientele. Scaled down traditional forest management approaches may work in some cases, but

there is a need to restructure both ideas and approaches to engage this ownership group. Hull *et al.* (2006) suggest management of these lands is important to sustain environmental services and because these owners are politically active. If educators and professional foresters are to remain relevant, they must proactively embrace changes to serve this growing audience and the resources they control.

The issue

Unfortunately, land parcelization in general and forest parcelization specifically are becoming our legacy. Early on, settlement of our country was largely driven by an individual desire for land readily within the reach of the commoner. Today, our transportation systems, recreation uses, economic successes, and individual demands and social expectations exacerbate land consumption. Numerous studies and reports document, quantify, and articulate the potential threats of our land resource consumptions (Egan & Luloff 2000, Macie *et al.* 2002, Sampson & Decoster 2000, Vince *et al.* 2005, Wear & Greiss 2002).

Resource professionals have the training to understand the effects and ramifications of landscape parcelization and its eventual fragmentation – the breaking apart of systems as we impose varying land uses. These same professionals find frustration in the parcelization of the land – the separation of land into different ownerships where objectives, if not land use, change and vary by owner wants and needs. Whether we fragment or parcelize the land, the potential to adversely affect forest and ecosystem health, economic structures, and future management are enormous. Resource professionals need to respond by encouraging responsible stewardship to traditional owners and to the new tenants of the land.

The management void

In the East, less than five percent of PFLs have a written management plan and only about 14 percent have sought management advice in the past five years (Butler 2008). Without a plan, or professionally offered advice, the likelihood any management, let alone sustainable management, decreases. Statistics for small ownerships, less than 10 acres, is not explicitly known; however, we do know large acreage owners are more likely to have a written management plan and seek advice (Butler 2008). Is a written forest management plan for small acreage landowners where timber harvesting and large scale disturbance important or necessary? It is likely a better understanding of basic ecological and management techniques through a local support network may result in the implementation of better stewardship practice that sustain ecological services will result with a level of planning.

The importance of private forestland ownership is indisputable. Increasingly, stakeholders from diverse perspectives recognize the role small ownerships serve as they provide ecological services to the public. Traditional economic benefits remain, but often there is increasing recognition of the social and ecological values forests provide. Eastern forest ownership patterns emphasize the need to consider the role of private forests.

In the past, governmental incentive programs focused on the timber base, encouraging forest owners to manage for products. Recent programs have expanded the discussion to wildlife, water, and recreation. The Forest Stewardship Program, launched in 1991, focuses on private forest management. A specific stewardship goal is to encourage PFLs to write management plans to guide their decision making. By 1997, 329,000 forest owners, controlling 16.5 million acres, received help to reach their goals through economic assistance in planning and education (Esseks

& Moulton 2000). This valuable program targets forest owners owning more than ten acres, leaving smaller acreage owners without publicly-supported technical or cost-share assistance.

Why was the threshold set at ten acres? Foresters argued smaller ownerships are too difficult to manage – it is inefficient. Can we afford this luxury? Weir & Greis (2002) argue we have to change our perspective and reach out to the landowner of smaller forests if we are to meet societal needs. The reliance on the one-on-one model for technical assistance presently used to assist forest owners is not practical for meeting the needs of the multitude of owners in fragmented landscapes.

With the current base of service providers and assistance programs, small acreage landowners rarely interact with resource professionals. This void calls for new tools, including educational material for small acreage forest owners that, to begin with, enable them to develop their own plan. Also needed are educational resources and opportunities to assist them with implementing practices. Cooperative Extension and agency partners are well situated to address this educational void. Perhaps more challenging is the current lack of service providers adept at working with small acreage landowners.

While train-the-trainer programs can provide local education delivery and mentoring and are a proven cost-effective way to leverage limited forestry resources for landowner education, are there alternatives for training potential service providers? New forestry education programs targeting professionals currently working with forest owners with small properties, such as home/landscape and arborist professionals, can equip them to pursue business opportunities servicing this clientele. Along with training opportunities for existing forest professionals such as loggers, foresters, and other natural resource professionals, a whole new cadre of service providers could evolve to fill this void.

METHODS

The objective behind the Woods in Your Backyard project was to reach small acreage landowners (1-10 acres) with research-based information to help them create or enhance natural areas while meeting their personal goals and improving their property's contribution to ecosystem health.

The initial grant from the U.S. Fish & Wildlife Service developed a team approach by Maryland, Virginia, and Pennsylvania Cooperative Extension systems along with a professional writer and targeted the Mid-Atlantic region. The authors initiated the project in early 2003 with publication of the manual in September 2006. While there was one initial meeting of the authors in early 2003, all other communication occurred through conference calls and email.

Approach

The first step was to define an approach to reach small acreage woodlot owners. Knowing there are increasingly more of them, and relatively, if not actually, fewer of us, we adopted a train-the-trainer model. The Master Gardener and the newer Master Naturalist programs are excellent examples of extension programs using this approach. Even in the forestry field, there are examples of success using this model (i.e., Coverts, Master Woodland Owners and Forest Steward Volunteers), which have had significant success reaching a greater number of PFLs through a trained volunteer network than by solely relying on trained professionals.

The train-the-trainer model simply attracts interested citizens to participate in training programs with the agreement that they will share information with others in a peer learning approach. Efforts are made to select individuals who are opinion leaders in their communities, have a record of volunteer involvement and are willing to commit some time to the effort. In practice, these individuals have access to networks and opportunities that can not be accessed by trained professionals, resulting in information dissemination by credible citizens in the community that is more highly valued and therefore more likely to be implemented. Additionally, peer-to-peer modeling has an additional advantage in that well-respected peers have more credibility than the “professional” who usually comes in as an outsider.

Tool

After choosing an approach, the authors began crafting the “tool” for training volunteers. However, we soon realized the product envisioned would also serve as a stand alone product for independent use, or self-assessment. *The Woods in Your Backyard: Learning to Create and Enhance Natural Areas Around your Home* (Kays et al. 2006) is the end result. Development proceeded using the following principles:

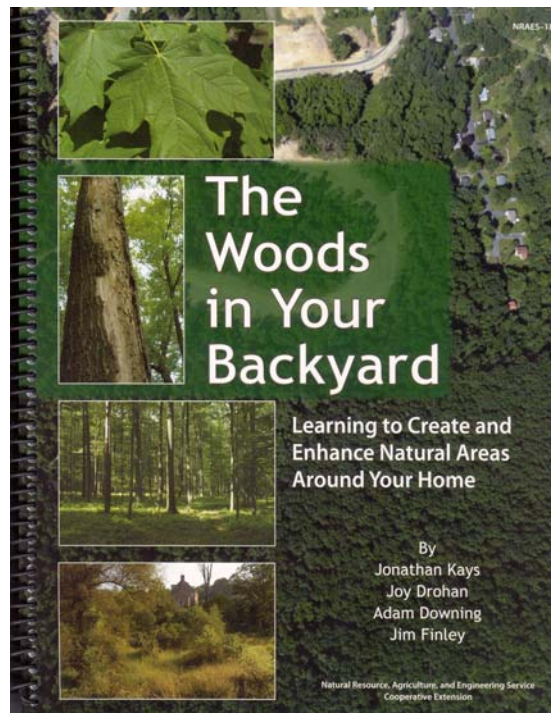


Figure 1: Self-guided planning workbook

- *Use a case study approach*
- *Focus on better management of existing natural areas and conversion of lawn into natural area*
- *Center on non-timber values*
- *Require no forestry tools or previous knowledge and avoid professional jargon*
- *Provide support materials for volunteers responsible for delivery and mentoring*
- *Include a workbook for personal assessment of the user's property*
- *Design the publication as a guide for group education and outreach efforts with new extension audiences*

- *Assume the user has Internet and/ or computer access to retrieve additional resources and make those resources available on-line and compact disk (cd)*

Before publication, we sought input from landowners in forestry volunteer programs and state agency foresters and wildlife biologists in Maryland, Pennsylvania, and Virginia. Using a focus group format, we found support for the case-study approach and received many useful comments on possible gaps in the tool. The publisher, the Natural Resource, Agriculture, and Engineering Service Cooperative Extension (NRAES), orchestrated a more formal peer-review to further refine the manuscript with input from volunteers and professionals representing a cross-section of stakeholders in the Eastern United States.

RESULTS

Training Workbook & Materials

The Woods In Your Backyard (Kays *et al.* 2006) uses a case-study approach to guide users through the process of creating their own plan while learning basic forest stewardship concepts. Two central goals of this manual and trainings is a focus on: 1) better managing existing natural areas, and 2) opportunities to convert “excess lawn” to a natural area such as a warm season grass meadow or early successional forest. Table 1 presents to the headings for the four major parts of the publication and incorporated workbook in part five.

Table 1. Publication contents

Part	Theme	Lessons
1	Introduction	Identify interests and mapping Family involvement Constraints to management
2	Property Inventory	Landscape view Management unit identification Tree & Plant identification
3	Ecological Processes	Succession Principals of Forestry Water resources Wildlife ecology
4	Putting Knowledge to Practice	Recreation & aesthetics potential Choosing projects Land management techniques Timetable of activities Recording progress
5	Workbook	Twenty activities completed while working through the first four sections and in tandem with a case study

While there are three case-studies in the publication, the users follow the Nelson’s story (a case-study) throughout the manuscript. When we introduce activities (which could become homework assignments, if the trainer chooses to deliver the material as part of a multi-day program) “The Nelsons” serve to demonstrate the results of their activity. For example, Activity 1 is to draw a

property map and the publication highlights the Nelsons. For Activity 2, we ask users to describe property features using a worksheet and present the Nelson's example to help them become more comfortable completing the activity for their property in the workbook portion.

Users who work their way through the material will have, in the end, a self-designed plan, with research-based input, to help them accomplish their goals in a sustainable and ecologically sound manner. Users may complete their plan as either an entirely self-guided process or as part of a facilitated training during which they receive introductory and some detailed instruction on the planning process and management methods.

In addition to the workbook, supplementary materials are available to various training groups. To accommodate different training groups, we created tools for customized training. Experience finds professionals gain familiarity with the material quickly (under an hour), while lay audiences usually require three hours or more to reach a comfort level with the publication and training materials. The training materials consist of the publication and a CD that includes an overview PowerPoint presentation adaptable for different audiences, as well as PowerPoint presentations which breaks the materials into multiple classes and provide additional photos and information.

The CD also includes electronic fill-able worksheets from the manual, a press release, brochure, ordering information, fact sheets from Maryland, Pennsylvania, and Virginia Cooperative Extension and other organizations, as well as web-links to other resources. One component of the manual is a resource list with websites for more information on specific topics (pages 131-138). This resource list is found on the website as a Word document along with website hyperlinked. The CD is only provided at some training sessions, and is not included with the publication when purchased. All resources found on the CD are available free for download at: www.naturalresources.umd.edu.

While targeted to the Mid-Atlantic region, the material has application to most areas of the country. Extension and other natural resource professionals can use the core manual and adapt the resource list, PowerPoint presentations, and other CD resources to suit their respective area.

Workshops

To date, this material has been used to train over 2651 volunteers and landowners in Virginia, Maryland, and Pennsylvania. Training has ranged from orientation to the material for state forestry personnel, to extension volunteers to the ultimate target audience of small acreage owners. Table 2 contains a typical agenda for conducting a workshop involving two sessions. The presentations focus on management of existing natural areas and on why and how to convert excess lawn to a more natural state. Depending on the trainer's time and comfort, it is easy to either expand or contract the program.

In Virginia, the initial effort to disseminate the training material was a presentation of the workbook and an overview PowerPoint to 69 field foresters with the Virginia Department of Forestry. This effort translated into several workshops initiated by local personnel, usually in partnership with one or more natural resources related agencies such as Cooperative Extension and Soil and Water Conservation Districts.

Ensuing workshops throughout Virginia have primarily targeted small acreage owners and extension volunteers using 1 or 2 part workshops. Since 2007, 13 workshops have been delivered in the Commonwealth. The participatory workshops integrate homework assignments toward plan development with the aim of providing participants with the first steps toward drafting their management plan and knowledge to implement practices.

As of this paper, evaluation data from six workshops held throughout the northern region of Virginia from 2007 and 2008's is available for analysis and summary. One-hundred and sixty-seven individuals participated in these 6 workshops and on average owned 5 acres. According to exit evaluations, 70 percent planned to complete a written plan at the conclusion of the workshop. In addition, 92 percent intend to better manage natural areas and 53 percent plan to convert excessive lawn to natural areas. In the post-survey, most participants (92%) indicated at least one action they plan to take in the next two months. An electronic evaluation two months after the program found that ideas and material were being used and all participants had begun the planning processes. At two months following the workshop, approximately, 10 percent had completed their written management plan. Following the training, many had made contacts with a local natural resource professional. Additional unsolicited feedback shows a change in attitude and action resulting in improved or expanded natural areas. For example, one participant said, "We have begun many of the improvements. It is a particular pleasure for us to replace non-native plants with native species and we have been actively removing invasive species."

Follow-up surveys found that extension volunteers, in addition to using the material for their own properties, are also using it to work with others.

An additional outreach program has targeted individuals and relevant Home Owner Associations (HOA) committees. To encourage this discussion, we have created a one-page fact sheet "Tending Natural Areas in Home Owner Association Settings" for insert into HOA information packets.

Anecdotally, we have observed first hand unique audience responses. As some researchers have discovered, small acreage landowners interact very differently with their land than traditional landowners (Hull *et al.* 2006). Literally, they know every square foot and they are all important to them. They are willing to invest significant energy, time, and fiscal resources into their property to achieve such non-pecuniary returns as observing wildlife, visual appeal, recreation and newer, non-traditional ecological services such as carbon sequestration, water quality, air purification, and altruistically for "the greater good" of society. We have observed small acre owners accept ideas such as creating edge between woodland and field or lawn and riparian buffers but envision them as a few feet deep rather than the 30-50 foot minimums generally recommended by natural resource professionals. Interestingly, they are often more attuned to the landscape surrounding their properties than larger acreage owners. These differences present additional challenges as well as opportunities.

DISCUSSION

Research into adult learning and the use of information by adults suggests self actuation – wanting to learn and to solve their own problems. is important and leads to higher levels of implementation (Knowles 1984 and Allman 1983). Extending these concepts is central to effective adult learning. We believe it is useful to engage landowners in developing their own

Table 2: Sample two-session workshop agenda

Session 1	
20 minutes	Welcome & Introductions
60 min.	General overview Situation & Issues Knowledge areas
30 minutes	Intermediate Use areas: Considerations & Tools Issues (water quality, environ. considerations) Opportunities/Tools (converting to natural area)
10 minutes	Homework assignment Read Lessons 1, 2 & 3 (pages 1 – 11) Complete activities 1, 2, 3, 4 (pages 81 – 86)
5 minutes	Wrap-up
Session 2	
20 minutes	Homework review What did you discover? Any surprises?
30 minutes	Wildlife management principals Wildlife needs Habitat management
45 minutes	Natural use areas: Considerations & Tools Crop tree management Invasive plants – identification and control
10 minutes	Sharing WIYBY with others
5 minutes	Evaluation

plans, which should lead to higher implementation levels. We set out to create a tool for owners of smaller tracts that they would find useful in a guided planning process. We believe we have a responsibility to reach out to the “new” landowner to provide an educational process they can use to guide their stewardship of land. We also believe we lack the capacity to lead this process using traditional materials and approaches. Therefore, we offer the tools and approach outlined in this paper to meaningfully address small acreage ownership issues to eventually affect economic, ecological, and social returns from the changing forests landscape.

Backyard woodlot workshops and the self-guided *The Woods In Your Backyard* workbook is a proven combination for reaching a currently underserved audience with both management information and mechanisms for designing their own plan and putting it into action. Planning leads to more informed decision making and on the ground practices embedded in stewardship (Esseks & Moulton 2000). The hopeful ecologic outcome of this initiative is to stitch back together natural systems interrupted by fragmentation with more seamless, though still parcelized, landscapes. Economically, service provider opportunities and a supply of forest-based resources may yield jobs and niche manufacturing.

A related effort looking to address a wider range of issues in rapidly developing regions was recently completed by the Southern Region of the United States Forest Service in cooperation with the University of Florida, Southern Group of State Foresters, U.S. Fish and Wildlife Service

and others. *Changing Roles: Wildland-Urban Interface Professional Development Program* (Monroe *et al.* 2006) is a training program and material compilation for natural resource professionals. The purposes of this program and the small acreage forestland owner outreach tools and methods described in this paper are compatible and share similar goals. While *Changing Roles* is not geared toward landowners, it is a tool that can and should be used by professionals and trained volunteers in landowner training.

Serving constituents/clients/stakeholders/etc. is the most basic premise of public programs. The challenge is to do this with limited resources. Does it make sense to divert already limited funds dedicated toward traditional landowners, toward this rapidly growing landowner segment? They only control a very small percentage of the overall acreage and ownership turns over rapidly. Can we really expect to affect change? Research by Kendra & Hull (2005) suggests this “new landowner” is very receptive, even “primed” to management input. Inputs dependent solely on professionals is not practical under even the best of funding and public support scenarios for the rapidly growing numbers of small acreage owners. Educational outreach that leverages volunteer energy, expertise and training, however, has the potential to diffuse rapidly through this well educated and receptive audience.

CONCLUSIONS

While *The Woods in Your Backyard* and associated workshops are a step toward reaching small acreage landowners, this is only one step. It is creating a better informed and active base of landowners ready to do what is best for their property while simultaneously meeting their ownership goals. A second critical step is to train service providers. Basic socio-economic data of small acreage owners suggest they would be willing to pay for professional assistance to achieve their management objectives (Hull *et al.* 2004). Trained service providers might have credentials and experience in a variety of areas such as raw material extraction (logging), resource management (forestry & wildlife), and home landscape care (arboriculture and/or horticulture). There is a clear need for individuals with a mix of skills who can work in the context of myriad ownerships and objectives. We need individuals with the traditional natural resource management skills, but they may also require a set of new skills. On the front of all this, they must have the ability to build trust (Hull *et al.* 2004) with this new clientele.

Professional training to prepare the different groups of professionals with the skills they need to work with this audience are beginning to emerge. Forestry, wildlife, and logging professionals need to partner with home/landscape care professionals to develop business solutions for interested small acreage owners. The training of these potential service providers should include an assessment of business, marketing, and economics that might demonstrate to professionals that serving this audience may improve their existing business model, profits and marketability. The needs related to developing professional service providers are further described in a companion paper in these proceedings called *Backyard Woodlost: Filling the Small Acreage Service Provider Gap with the Green Industry* by Kays J., A. Downing, J. Finley.

ACKNOWLEDGEMENTS

The authors thank the funding agencies, U.S. Fish & Wildlife Service and the Virginia Department of Forestry through the Potomac Watershed Partnership of this project for their patience and financial support. In addition, we thank our respective institutions, Virginia Tech,

University of Maryland and Penn State University for various resources provided throughout this ongoing effort.

REFERENCES

- Allman, P. 1983. The nature and process of adult development. In: Tight, M., ed. *Adult learning and education*. London: Groom Helm: 107-123
- Birch, T.W. 1996. Private forest-land owners of the United States, 1994. Resource Bulletin NE-134. U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 183 p.
- Butler, Brett J. 2008. Family Forest Owners of the United States, 2006. Gen. Tech. Rep. NRS-27. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 72 p.
- Esseks, J.D.; Moulton, R.J. 2000. Evaluating the forest stewardship program through a national survey of participants. In: Munn, I.A., ed. *Proceedings of the Southern Forest Economics Workshop, Biloxi, MS.*, Athens: University of Georgia: 168 – 173. <http://sofew.cfr.msstate.edu/papers/33esseks.pdf> [Date accessed: February 5, 2008]
- Egan, A.F.; Luloff, A.E. 2000. The Exurbanization of America's Forests: Research in Rural Social Science. *Journal of Forestry*. 98(3): 26-30.
- Hull, B.R., Robertson, D.P.; Buhyoff, G.J. 2004. Boutique Forestry: New Forest Practices in Urbanizing Landscapes. *Journal of Forestry* 102(1): 14-19.
- Hull, B.R.; Ashton, S.F.; Visser, R.N. 2006. Who are Interface Landowners? In: Monroe, M.C.; McDonell, L.W.; Hermansen-Báez, L.A. eds. *Changing Roles: Wildland-Urban Interface Professional Development Program*. Gainesville FL: University of Florida: 1-10. Fact sheet 2.1. www.interfacesouth.org/products/pdf/mod2fs1.pdf [Date accessed: February 5, 2008].
- Kays, J.; Drohan, J.; Downing, A.; Finley, J. 2006. *The Woods in Your Backyard: Learning to Create and Enhance Natural Areas Around Your Home*. Ithaca, NY: Natural Resource, Agriculture, and Engineering Service. 138 p.
- Kendra, A.; Hull, R.B. 2005. Motivations and Behaviors of New Forest Owners in Virginia. *Forest Science* 51(2): 142-154.
- Knowles, M. 1984. *Androgogy in Action: Applying Modern Principles of Adult Learning*. San Francisco: Jossey-Bass Publishers. 444 p.
- Macie, E.A.; Hermansen, L.A. eds. 2002. Human influences on forest ecosystems: the southern wildland-urban interface assessment. Gen. Tech. Rep. SRS-55. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 159 p.
- Metcalf, A., Finley, J.C.; Luloff, A.E.; Stedman, R.C. (Unpublished Data). Private Forest Landowner Access Study. Penn State University. University Park, PA.
- Monroe, M. C.; L. W. McDonell; L. A. Hermansen-Baez (Eds.). 2006. *Changing Roles: Wildland-Urban Interface Professional Development Program*. Gainesville FL: University of Florida.
- Sampson, N.; DeCoster, L. 2000. Forest Fragmentation: Implications for Sustainable Private Forests. *Journal of Forestry*. 98(3): 4-8.
- Vince, S.W., Duryea, M.L.; Macie, E.A.; Hermansen, L.A. eds. 2005. *Forests at the Wildland-Urban Interface: Conservation and Management*. Boca Raton: CRC Press LLC. 312 p.
- Wear, D.N.; Greis, J.G. 2002. Southern Forest resources assessment: summary report. Gen. Tech. Rep. SRS-54. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 103 p. www.srs.fs.fed.us/sustain/report/index.htm [Date accessed: February 5, 2008].

PROPERTY TAXES AND FORESTS IN WEST VIRGINIA: A HISTORICAL REVIEW

Jenny Fortney¹ and Kathryn G. Arano²

Abstract--West Virginia has a history of under assessed land values, which led to financially handicapped local governments, and hefty tax burdens on local citizens. Local property tax revenues have always been insufficient for local government administration throughout the history of the state. Though the state government has made several attempts to correct underassessment problems in West Virginia, these measures have been largely unsuccessful. The West Virginia legislature ratified the forestry amendment in 1946 to allow special taxation of forest land, but due to the underassessment problem a policy to carry out special forest taxation was not enacted until 1991, when the West Virginia legislature ordered a state wide reassessment of all property in the state. Managed Timberland was created in anticipation of the expected drastic change in property assessment values. Since the enactment of Managed Timberland no detailed research has been conducted to determine the benefits of the policy to the state or to private forest landowners. Managed Timberland has low enrollment rates and may be an unfair shift of the tax burden to non-forest owners. Tax assessment needs to be fair, impartial, and equal across all locations in the state, and easy for landowners and tax assessors to understand. A detailed study of Managed Timberland is needed to determine the effectiveness of the policy.

INTRODUCTION

Preferential property taxation of forest land is currently being employed in all fifty states (Hibbard *et al.* 2003). Individual states have been the subject of several studies on both structure and effectiveness of their programs (e.g., Baughman *et al.* 2003; Jacobson 2001; Rathke 1993; Wagner *et al.* 2002). However, the West Virginia's tax incentive program has not been scrutinized at the level of other states' forest tax incentive programs. Implications of this tax policy on private forest landowners' decisions may be significant. Privately owned forestland in West Virginia accounts for 83% of the total forest land in the state (White 1993). West Virginia has approximately 260,000 nonindustrial private forest landowners, which hold 9.7 million acres of forest land (USDA Forest Service 2007). West Virginia Managed Timberland acres have remained stable at just over 2 million since 1998 (Dye 2006). The lack of enrollment in West Virginia's Managed Timberland program since 1998 (Dye 2006) may be a cause for concern regarding the success of the policy.

¹ West Virginia University, Davis College of Agriculture, Forestry and Consumer Sciences, Division of Forestry and Natural Resources, 322 Percival Hall, PO Box 6125 Morgantown, WV 26507, jbellars@mix.wvu.edu

²Kathryn.Arano@mail.wvu.edu

A historical review of West Virginia's Managed Timberland program as related to forest land can provide relevant information for a more detailed study of the policy especially as it relates to private forest landowners. Landowner perceptions of the policy today can be evaluated within the framework of the state's forest tax policy history. Reviewing the implications of past policies can foster an understanding of the context within which informed recommendations for policy improvements and future research can be made. Thus, this paper presents a historical review of West Virginia's Managed Timberland Program.

THE PROPERTY TAX

Property taxes are as old as civilization. The earliest known property tax records are clay tablets from Lagesh, a former city-state in what is now Iraq, from around 6,000 B.C. (Carlson 2005). Early property taxes were in the form of a percentage of production from the land, usually food, but the ancient empires with a system of currency used value assessments and collected money for property taxes. The property tax system in place today, with a system of appraisal records and assessed value owed by individual, dates to post medieval Europe, and was developed by William the Conqueror, of Magna Charta fame (Carlson 2005). The puritans of Massachusetts used a property tax system to generate revenue for public works, education, and even welfare (Carlson 2005). The property tax in America as carried over from Europe was implemented because land was seen as a reliable measure of one's ability to pay (Bjork 1980). When the United States was formed the constitution barred tax on income and the concept of an annual income tax was not common (Bjork 1980). In recent times, the property tax has been increasingly viewed as regressive, with the largest portion of the tax burden falling on those least able to pay (The Appalachian Land Ownership Task Force 1983; Hibbard *et al.* 2001).

FOREST LAND USE POLICY

The historical pattern of how property law in the United States has encouraged timber exploitation is an American phenomenon. The British common law had evolved into one favoring conservation, as by the 1700's, Britain's forest supply was already threatened (Sprankling 1996). Prior to the Revolution, the British government actively discouraged settlement west of the Allegheny Mountains and implemented policies designed to protect the timber supply of the colonies from exploitation as the vast forests were seen as a valuable reserve for the British Navy (Sprankling 1996). The infant United States similarly viewed the vast forest wilderness as a government resource that could finance the new country's debt, and so a policy of cash only land purchase from the government was maintained with laws prohibiting squatting on frontier land (Sprankling 1996).

The expansion of the United States with the Louisiana Purchase helped to change this governmental policy view into one in which the wilderness was viewed as a hindrance to progress that must be tamed and land was seen as cheap and plentiful (Sprankling 1996). The passage of the Homestead Act in 1862 sealed the fate of the western wilderness. Common property law, which is formed by court precedent, favored agrarian and developed land uses. Court decisions on land disputes favored the party that made 'improvements,' which is to say the claimant had harvested timber, plowed fields, or erected buildings, regardless of legal holder of title (Sprankling 1996). Federal and state policies also contributed to resource depletion, with much of the timber in the northeast and upper Midwest being tax exempt (Hibbard *et al.* 2001) This tax exemption was presumed to be a conservation effort due to foreseen shortages, but in

reality it acted as a tax shield for land speculators to buy timber resources log them quickly and move on.

The different economic preference of the north and south also contributed to faster timber resource depletion in the north. In the north, property tax was the preferred form of gathering government revenue, but the plantation economy of the south, with its politically powerful holding vast amounts of property both in land and slaves, preferred to avoid property taxes and favored poll taxes and fees for government revenue (Carlson 2005). This difference in attitude toward land ownership patterns and property taxation was a contributing factor in the strife between eastern and western Virginians, which eventually would lead to the secession of West Virginia (Rasmussen 1994).

THE FAIRCHILD REPORT

By the beginning of the 1900's, the forests of the northeast and Midwest were almost gone. Future timber supply was a growing policy concern. In the northeast, this problem was recognized early with Connecticut being the first to attempt to pass a preferential forest tax law in 1817 (Fairchild 1935). Yale economist, Fred Fairchild, completed his study of the effects of ad valorem, which is according to full market value, property taxes on forestry investment in 1935. Fairchild concluded that ad valorem property taxation of forests encouraged premature harvesting, acted as a disincentive for reforestation efforts, and encouraged conversion of forest lands to developed uses (Colligan 2001). These findings and numerous subsequent studies are the basis on which preferential forest property tax policy is validated (Klemperer 1977). Maryland was the first to pass a modern preferential forest property tax in recognition of the Fairchild findings in 1956 (Dunford 1979). The major reason behind the delay in recognition of property taxes as a problem for encouraging forest investment and state implementation of policy to address the problem is that many states had to add amendments to their constitutions to authorize their legislatures to extend property tax breaks to forest landowners because of equal protection clauses contained in the financial articles within those state constitutions (Malme 1993).

ECONOMICS, POLITICS, AND TAXES IN WEST VIRGINIA

The timetable of the history of West Virginia's property taxation is presented in Table 1. The economic and political background of West Virginia was dominated by two classes, large land holding speculators and small land holding mountain farmers (Rasmussen 1994). The east and west of old Virginia held opposed public finance ideals. Western Virginians desired higher property taxes to fund public improvements and encourage development while eastern Virginians preferred low property taxes due to the plantation economy and large speculative land holdings in the western part of the state (Rasmussen 1994). Local leaders in western Virginia contributed to the western finance problem further by creating misguided policies such as exempting coal and timber from taxes in an attempt to encourage development (Rasmussen 1994). After the Civil War, the new state of West Virginia was dominated by absentee speculative land holdings, with the smaller mountain farmers bearing the tax burden for state and local funding (Rasmussen 1994). By 1884, the new state's tax commission recognized that absentee speculators foreshadowed economic disaster, stating, "A state is prosperous if property is owned by its citizens." (Rasmussen 1994).

Citizens of the new state of West Virginia were already grumbling about corporate tax exemptions, especially railroads, prompting the 1872 constitutional provision that permitted taxation of corporate wealth (Ambler and Summers 1958). Certain agricultural products were granted tax exemption in 1875, an economic depression year, which led to state fund shortages (Ambler and Summers 1958). In 1882, the West Virginia Supreme Court ruled that all exemptions were unconstitutional under the West Virginia constitution and Governor Jackson

Table 1. Timetable of events in West Virginia’s property tax policies.

Year	Event
1863	WV becomes a state. Timber is already exempt under pre-existing Virginia law
1872	Constitutional amendment permits taxation of corporate wealth
1875	Economic depression year
1882	Tax exemptions declared unconstitutional Governor Jackson orders statewide appraisal
1904	Law requiring all property be taxed at true and actual value
1932	Land forfeiture high. Taxes at \$2.65/\$100 Public schools close due to lack of funds
1933	Tax Limitation Amendment
1935	Fairchild and Assoc. forest tax study
1946	Forestry Amendment
1948	Besley WV forest tax study
1954	Governor Marland's tax commission committee report
1958	Begin statewide reassessment
1967	End Statewide reassessment
1982	Pauly v. Bailey. Killen v. Logan County Commission Tax Limitation and Homestead Exemption Amendment Statewide reappraisal
1984	Legislature fails to ratify 1982 appraisal
1990	House Bill 4127. Managed Timberland
1991	Managed Timberland goes into effect

ordered a statewide assessment and compliance with the court’s decision, but most assessors did not comply (Ambler and Summers 1958).

The West Virginia constitution was essentially a copy of Virginia’s, as the state was born in war and need was immediate, which means the tax policies of Virginia carried over to the new state, with the only change being the prohibition of slavery (Davis *et al.* 1963). There was little change in the mode of government finance and the property tax system remained in place until Governor White began his term in 1900 (Davis *et al.* 1963). This is not to say that there were no problems during the period between achievement of statehood and Governor White’s campaign, which was run on a platform of tax reform (Rice 1985).

Governor White, true to his campaign promise, formulated a tax review committee, which set forth the recommendation that state and local revenue be separated with property taxes reserved

for local government revenue (Rice 1985). In 1904, the legislature mandated that all real and personal property be assessed at its true and actual value and allowed no exemptions except property for religious entities and for education (Ambler and Summers 1958). West Virginians still paid a small property tax, but World War I brought a proportionally large increase as evidenced by comparing the 1913 average tax rate of \$0.01/\$100 value to the 1915 average of \$0.15/\$100 value (Davis *et al.* 1963). The post World War I period saw an increase in demand for roads, construction, and education, which was locally financed by increases in the property tax (Davis *et al.* 1963). By 1932, the state was in a financial crisis. With the onset of the Great Depression, and the average property tax at \$2.65/\$100 assessed value, land forfeiture rates were large and public schools were forced to close due to lack of funds (Ambler and Summers 1958).

To relieve landowners from forced forfeiture, the Tax Limitation Amendment of 1933 was passed, which created four property classes with low capped assessments per \$100 of value, with a provision that counties may levy excess taxes if approved by referendum vote, and allowed the state to levy an income tax to generate revenue (Davis *et al.* 1963). This classification system is the oldest of such systems in the United States, and has never been changed since 1933 when it was passed (Bowman 1984, WV State Tax Department 2000). With this sharp cut in revenue source, local governments in West Virginia were forced to rely on state funds, and the state, in turn, made itself obligated to provide the financial assistance to local governments so that they could continue to provide the state's citizens with needed services (Davis *et al.* 1963). In 1954, Governor Marland created a commission to analyze state and local finance. The commission's report stated of the property tax system, "property is valued erratically, taxed lightly, and the burden is distributed unevenly" (Davis *et al.* 1963, p188). In 1958, the legislature ordered a reassessment of all property, except utilities (Davis *et al.* 1963), which was conducted from 1958 to 1967 (White 1991).

In 1982, with underassessment having continued to be a problem since the 1930s, two court decisions, *Pauly v. Bailey* and *Killen v. Logan County Commission*, brought the property tax issue to the legislative floor. In both cases, the courts ruled that tax rates were inequitable, as evidenced by such disparities as class II property comprising 21.23% of West Virginia land value, but only paying 12.97% share of the property tax. The courts ordered immediate remedial action (Bowman 1984). The same year, legislature again ordered a reassessment under the Tax limitation and Homestead Exemption Amendment (White 1991). The reassessment was conducted, at a \$35 million expense, but the new values were never implemented, due to failure of the legislature to ratify them during the 1984 session (Colyer and Ferrise 1991). As a consequence, many properties in West Virginia as of 1991 were still taxed according to values from the 1958 to 1967 reassessment (White 1991). House Bill 4127 introduced and passed in 1990, again ordered a reappraisal, giving assessors three years to complete, and ordering a reappraisal every three years thereafter (Colyer and Ferrise 1991). However, even reappraised properties in neighboring counties and being of the same type were vastly different, with some landowners reporting two similar parcels with assessments of \$20 in one county and \$100 in another, though they were the same size (White 1991). A recent survey of landowners conducted by Fortney and Arano (*In press*) also indicates that this problem has persisted in the current Managed Timberland program based from the comments from landowners who were surveyed.

By 1993, the average statewide tax rate had declined from \$2.27 per \$100 of assessed value in 1990 to \$2.15, and continued to decline in subsequent years (WV State Tax Department 1979-

1995). This rate decline is typical when long periods pass between appraisals (Bowman 1984). What is often forgotten when using Fairchild's findings is that he not only concluded that the property tax is biased against forestry, but also that the local administration of the property tax is inefficient and local assessors are usually unqualified individuals. He also specifically mentions that use of the local sheriff as a tax collector, as is the case in West Virginia, is not a practical form of tax administration, as this is an elected official, politically motivated and already burdened with the other duties of his office. Fairchild strongly recommends against this form of local assessment and collection. Though West Virginia has attempted to correct the underassessment problem through orders for reappraisal, this does not directly address the true root of the problem, according to Fairchild's assessment of the issue.

FOREST PROPERTY TAXES IN WEST VIRGINIA

The pre-Civil War absentee landowners of Virginia enjoyed tax exempt status of the timber they owned (Rasmussen 1994). The West Virginia Supreme Court ruling of 1882 found such exemptions to be unconstitutional, and the 1904 tax reforms allowed no such exemption (Ambler and Summers 1958). By 1909, West Virginia reached the peak of its timber production and after World War I, timber production was in steady decline (Ambler and Summers 1958). The passage of the Clark-McNary Act and subsequent research including the Fairchild report indicated that new policies for forest taxation were needed (Hibbard *et al.* 2001). Besley (1948) reviewed forest taxes in West Virginia for the years 1939 to 1941, and found that for the state as a whole, nonfarm forests were assessed at approximately 102% of their full value, but farm forests were assessed at only 74% of their full value. The Forestry Amendment was added to the West Virginia Constitution in 1946, allowing exemption or special treatment of lands used for forestry in property tax assessments (Colyer and Ferrise 1991). However, adoption of a policy instrument to implement use value on forested lands was not considered a pressing issue because property tax assessments were already low due to an overall underassessment problem (White 1987).

After the failure of the 1982 reassessment, House Bill 4127, in 1990, again tried to address the underassessment issue and introduced, in anticipation of increased value of appraisals, the state of West Virginia to the use value assessment for forestry in the form of Managed Timberland (Colyer and Ferrise 1991).

THE MANAGED TIMBERLAND PROGRAM

The West Virginia Managed Timberland Program is administered by the state local tax assessors with the state Division of Forestry serving an advisory role, uses current use valuation, has a minimum productivity requirement, and requires that the landowner has an active written management plan and apply in order to receive the preferential tax treatment (Malme 1993; WV Code §11). West Virginia defines timberland and managed timberland as two distinct categories. Title 110, West Virginia Legislative Rule, Department of Tax and Revenue, defines timberland as "...any surface real property, except farm woodlots of not less than ten contiguous acres, which is primarily forest and which has, in consideration of their size, sufficient numbers of commercially valuable species of trees to constitute at least forty percent (40%) normal stocking of forest trees, ..., which are well distributed over the growing site. Additionally, land that has been recently harvested of merchantable timber and is growing into or being planted as a new forest may be classified as timberland" (WV §110-1H-3.20). The definition of managed timberland is the same with the exception that the legislation continues with, "...and that it is

managed pursuant to a plan...” (WV §110-1H-3.10). Title 110 also specifies that timberland shall be appraised by a comparable sales approach at market value and assessed at 60 percent and that managed timberland shall be appraised based on the potential of the land to produce income based on a discounted future net income and site index (WV §110-1H-2).

In compliance with the 1946 constitutional amendment, the legislation also requires that the landowner enter into a contract with the state Division of Forestry, which specifies that the land is being used in a timber management program that employs erosion control, best management practices, and that enhances the growth of commercially desirable species (WV §110-1H-13). A professionally prepared forest management plan is required and must include the owner’s objectives and provisions for 40% or greater stocking, continuous crops of timber, protection against threats, forest regeneration, and compliance with the Logging Sediment Control Act (WV §110-1H-3.11 and WV §110-1H-13). Currently, the only penalty in West Virginia for change of land use is decertification from the program, and penalty for failure to comply with requirements of the program is a fine equal to lost property taxes from the time of non-compliance to decertification at a 9% interest rate (WV §11-1C-11a(c)). No uses of conveyance or roll-back taxes are currently employed in West Virginia (Malme 1993; WV §11-1C-11a). Some abuse of the program is noted in which investors are using Managed Timberland as a tax shield on large tracts and selling land in lots, prompting the suggestion of implementation of a roll back penalty (Dye 2006).

Potential Benefits:

The foundation of the problem with ad valorem forest property taxation can be found in the nature of compound interest and the discount rate. Large amounts of up-front investment and long intervals of time are required to reforest denuded lands, during which an annual property tax payment is due, but the landowner can realize no income on the property until the timber is mature. The result of the annual tax and the discounted deferred income is a higher tax ratio for the forest owner with an immature stand compared with those who obtain annual benefits from their land. Marquis (1939) further emphasizes this point, that the principle deterrent cost owners of immature timber face is the interest rate of being forced to hold their capital for lengthy amounts of time, or the opportunity cost. The principle of preferential forest tax treatment, then, is to influence landowner forest management behavior toward socially desirable practices by reducing this opportunity cost. Because ad valorem forest taxation is an inequitable tax compared to other land uses, bringing the tax to a more equitable level could promote better forest management practices, promote interest in sustained yield forestry and remove part of the disincentive to reforestation of cutover lands (Fairchild 1935; Hall 1935).

Recent studies have affirmed the findings of the Fairchild report, with NIPF landowners reporting property taxes as an important influence on their decisions to harvest timber, and sell or subdivide and develop land (Hibbard et. al 2001 and 2003; Jacobson 2001; Rathke 1993). Klemperer (1977) and Miller and Rose (1985) also confirm that ad valorem taxation is not non-neutral in land allocation decisions and is decidedly biased against forestry and agricultural land uses.

Managed Timberland may correct a positive externality market failure. Forest use taxes shift the tax burden from the provider of scenery and open space to the enjoyer of these amenities (Seldon 1981). Forestry is suited to this region both environmentally and economically, for timber and recreational tourism. This was noted early in the literature on West Virginia’s ecology by Millard

Peck (1929) and Paul Eke (1929) who stated that West Virginia's soil and topography was better suited to forestry than for any other endeavor. More recent environmental concerns are addressed when noting that forest use valuation also provides an incentive to return the land to forested use in surface mine reclamation (Probert 1999).

Potential Problems:

Some studies have shown that forest use valuation is inefficient, with low benefits and high administration costs (Hyde *et al.* 1987). The West Virginia Department of Taxation reported in 2000 that Managed Timberland caused a 2.6 billion dollar loss in property tax revenue per year. This figure only reflects costs to the state, and research to find a value for benefits is needed to make this number meaningful.

A study in Pennsylvania found that most NIPF landowners are uninterested in timber harvest and the forest management efforts of those enrolled in the forest tax program are not significantly different from those not in the program (Jacobson 2001). Brockett and Gebhard (1999) found that Tennessee forest landowners had no significant difference in forest management behavior between Greenbelt participants and non-participants. Clendenning and Stier (2002) conclude that forest tax incentives have limited appeal to those that are targeted while developers abuse the preferential tax shelter for land speculation. They also find unintentional disincentives inherent in the tax policies, such as private landowners destructively harvesting prior to enrollment, converting forests to pasture and enrolling in farmland programs because of better tax breaks, use of the programs as a tax shelter prior to development, and subdivision and development of portions of property while retaining the remainder in the forest tax program. Hibbard *et al.* (2003) reported in a nationwide review that forest tax policies only modestly achieved policy objectives. Many studies have also concluded that forest tax incentives only delay, but do not prevent conversion of forest land to developed uses (e.g. England 2002; Jacobson 2001; Malme 1993; Dunford 1979).

An overwhelming criticism is that penalties for withdrawal or land use change are too low or non-existent encouraging use of these programs as a tax shelter by land speculators (Dunford 1979; Dye 2006). While Dye (2006) speaks highly of the policy's intention and states that sustainable forestry is encouraged by Managed Timberland, he admits that the program has been used as a tax shelter by land speculators. Jacobson (2001) finds this to be a problem with Pennsylvania's Clean and Green program, as well.

DISCUSSION AND CONCLUSIONS

An examination of the property tax in West Virginia historically indicates that there are problems not directly addressed by corrective policies used by the state. In West Virginia, the problem was that small farmers bore the bulk of the tax burden while large tracts of speculator land was exempt or under assessed, which led to financially handicapped governments, and hefty tax burdens on local citizens. The Tax Limitation Amendment was meant to correct this problem, but the result of the low rate caps have made the local government more dependent on state financial assistance and have resulted in every county voting in excess taxes and school bond levies (Bowman 1984). Local assessors appear to have adjusted the trend of heavier burdens on local landowners themselves, as now it is the non-resident large tract holders that are taxed more heavily, with in county residents paying \$0.84 per acre, in-state out of county residents paying \$1.61 per acre, and out of state residents paying \$1.51 per acre, on average in West Virginia in

1980 (Appalachian Land Ownership Task Force 1983). However, this does not completely resolve the inequitable distribution of property taxes. Moreover, this highlights the argument of Fairchild that local tax assessors are inefficient administrators of the property tax. Both Fairchild (1935) and Bowman (1984) have argued for a more centralized tax and accounting system. The court decisions in 1982 made clear that the state tax commissioner was the ultimate tax authority in West Virginia, but at the local level, assessor behavior appears to remain unaffected. West Virginia has a state equalization board, but an equalization board cannot correct an assessment problem if the underlying appraisal is inaccurate (Fairchild 1935), which is likely given the findings of disparate assessments by White (1991), Bowman (1984) and the Appalachian Land Ownership Task Force (1983).

Several studies (e.g. Bjork 1980, Appalachian Land Ownership Task Force 1983, Rasmussen 1994) show that the property tax, particularly in Appalachia is regressive. For example, in 1983, 52% of Appalachian land owners that held less than 250 acres paid more than \$1.00 per acre while only 23% that held more than 1,000 acres paid as much (Appalachian Land Ownership Task Force 1983). In the past, West Virginia forest landowners were characterized by lower income categories, with 51% of them having annual incomes below \$10,000 in 1975 (Birch and Kingsley 1978). However, a recent study of West Virginia forest land owners shows that the income distribution has changed, with only 9.6% having incomes below \$20,000 in 2005 (Joshi 2007). This implies that a policy that shifts the tax burden in any way may not be wise. Due to other forms of wealth such as stocks, property ownership is not any longer always an indication of an individual's wealth or ability pay (Bjork 1980), as it was when the concept was first developed back in 6,000 B.C. With the shift in landowner demographics toward individuals with higher incomes and reasons for forest ownership shifting from commercial timber production to environmental amenities, a concern of policies like Managed Timberland is that society is placing a tax burden on those unable to afford to buy or keep forest land.

Due to the inherent inefficiency of the ad valorem property tax in general (Bjork 1980) and especially in regard to forest uses (Fairchild 1935; Klemperer 1977), it is not reasonable to recommend elimination of preferential forest taxation. The preferential forest tax acts to restructure the property tax system to one that is more equitable (Hall 1935). Better solutions to the lack of desired landowner response to this incentive must be realized. Even Fairchild (1935) acknowledged that adjustments in property taxation would need to be used in concert with other policies. It is recognized that property taxes are a blunt policy instrument and that variability in forest landowner characteristics makes it unlikely that it can be otherwise (Jacobson and McDill 2003).

An important question to address is how much of a landowner's decision to practice managed forestry is based on taxes. It has been demonstrated that taxes affect land use allocation (Miller and Rose 1985; Bjork 1980; Klemperer 1977). It has also been demonstrated that landowners receiving tax breaks do not manage their land in a way that is statistically different from landowners not receiving preferential forest taxes (Kilgore *et al.* 2007; Brockett and Gebhard 1999). Landowners in these studies are indicating that taxes are important when directly asked, but the statistics are showing differently. Preliminary findings of the study by Fortney and Arano (*In press*) currently being conducted on Managed Timberland indicate that West Virginia land owners admit that taxes have little impact on their forest land use decisions.

While the preferential forest tax may have corrected a basic inequity in the ad valorem tax, it does not appear to be adequate to address urban sprawl and forest fragmentation. Fortney and Arano's (*In press*) preliminary analysis of taxes per acre of Managed Timberland participants and non-participants shows that the average tax per acre is only slightly less for participants and not statistically different. The average of participants' taxes per acre is skewed upward by large taxes per acre from only four counties, all of which are in high development areas. It is possible that the landowner decision is more influenced by the high profit associated with selling land rather than how much they pay in property taxes whether they are enrolled in a forest tax program or not.

A shortage of research on the welfare effects of forest tax treatment needs to be addressed (Jacobson and McDill 2003). Forest tax policies should be simplified to be made more transparent and understandable to landowners and easier for local tax authorities to administer (Fairchild 1935; Jacobson and McDill 2003). Program outreach and reward systems should be more in keeping with known NIPF landowner values and beliefs (Malme 1993; Jacobson and McDill 2003). Preferential forest taxes should not be the only incentive offered, as property taxes are not the only disincentive to land retention that NIPF landowners face (Fairchild 1935; Malme 1993; Hibbard et al. 2003; Jacobson and McDill 2003). Other complimentary programs should be introduced.

Currently, a study is being conducted by Fortney and Arano on West Virginia's Managed Timberland program. The study will examine landowner attitudes toward property taxes and how taxes and Managed Timberland participation affect their land use decisions. This historical review provides a context in which the results of the on-going study can be examined. In addition, to provide a complete picture of the impacts of the state's current forest tax program, future research should focus on welfare effects and an examination of tax assessor knowledge and attitudes, as has been done in other states (e.g. Jacobson and McDill 2003; Rathke 1993; Hyde *et al.* 1987).

LITERATURE CITED

- Ambler, C. H., and F. P. Summers. 1958. *West Virginia: The Mountain State*. 2nd ed. Prentice Hall, Inc., Englewood Cliffs, NJ. 584p.
- The Appalachian Land Ownership Task Force. *Who Owns Appalachia? Landownership and It's Impact*. University Press of Kentucky, Lexington, KY. 235p.
- Baughman, M. J., K. Updegraff, and J.C. Cervantes. 2001. "Motivating Forest Landowners in the North Central United States." Unpublished, University of Minnesota. Available at <http://www.regional.org/au/au/infro/2001/Baughman.htm>.
- Besley, L. 1948. *Taxation of Forest Lands in West Virginia*. Agriculture Experiment Station, College of Agriculture, Forestry, and Home Economics, West Virginia University. Bulletin 333, November. 39p.
- Birch, T.W. and N.P. Kingsley. 1978. *The Forest Landowners of West Virginia*. U.S.D.A. Forest Service, Resource Bulletin NE-58.
- Bjork, G. C. 1980. *Life Liberty and Property: The Economics and Politics of Land-Use Planning and Environmental Controls*. D.C. Heath and Company, Lexington, MA. 137p.
- Bowman, J.H. 1984. "Property Tax Equity and Efficiency." Report #4: Research report submitted to the West Virginia Tax Study Commission. March.

- Brockett, C. D., and L. Gebhard. 1999. "NIPF Tax Incentives: Do They Make a Difference?" *Journal of Forestry*. April: 16-21.
- Carlson, R. H. 2005. "A Brief History of Property Tax." *Fair and Equitable*, February, 3-8.
- Clendenning, J.G., and J. C. Stier. 2002. "Ecosystem Management and Preferential Property Taxes for Forestland in the United States." *Forstwissenschaftliche Beitrage – ETH Zurich*, 2002 (27), 47-57.
- Colligan, D. J. 2001. "Forest Land Taxation in the New Millennium: Stewardship Incentivized." *Denver University Law Review*, (78:3), 413-428.
- Colyer, D., and A. Ferrise. 1991. "Real Property Tax Issues and Problems in West Virginia." Institute for Public Affairs, West Virginia University, Monograph Series No. 4, Chapter 1. Available at <http://www.polsci.wvu/ipa/mono/html/mon4chap1.html>
- Davis, C. J., E. R. Elkins, C. M. Frasure, M. M. Reeves, W. R. Ross, A. L. Sturm. 1963. *West Virginia State and Local Government*. Morgantown Printing and Binding Company, Morgantown, WV. 477p.
- Dennis, D.F. 1989. "An Economic Analysis of Harvest Behavior: Integrating Forest Ownership Characteristics." *Forest Science* 35: 1088-1104.
- Dunford, R. W. 1979. "A Survey of Property Tax Relief Programs for the Retention of Agricultural and Open Space Lands." *Gonzaga Law Review*, (15), 675-699.
- Dye, C.R. 2006. Report on Managed Timberland Program. West Virginia Division of Forestry, December.
- England, R. W. 2002. "Current Use Property Assessment and Land Development: A Review of Development Penalties." *State Tax Notes*. 26:11:793-797.
- Eke, P. A. 1929. "The Community as a Factor in Classifying Land for Agricultural and Forestry Utilization in the West Virginia Appalachians." *Journal of Farm Economics*, July (11), 412-421.
- Fairchild, F. R., and Associates 1935. *Forest Taxation in the United States*. U.S.D.A. Forest Service Miscellaneous Publication No. 218, Washington D.C.; October. 681 pp.
- Fortney, J. and K.G. Arano. (In press). An Evaluation of Forest Landowners' Participation in West Virginia's Managed Timberland Tax Incentive Program. In: *Proc. Southern Forest Economics Workshop*, March 8-10, 2009, Chapel Hill, NC.
- Hall, R. C. 1935. "The Forest Tax Problem and its Solution Summarized." *USDA Miscellaneous Publication No. 358*. 18pp.
- Hibbard, C. M., M. A. Kilgore, and P. V. Ellefson. 2001. "Property Tax Programs Focused on Forest Resources: A review and Analysis." Staff Paper, Department of Forest Resources, University of Minnesota.
- Hibbard, C. M., M.A. Kilgore, and P.V. Ellefson. 2003. "Property Taxation of Private Forests in the United States." *Journal of Forestry*, April/May: 44-49.
- Hyde, W. F., R. G. Boyd, and B. L. Daniels. 1987. "The Impacts of Public Interventions: An Examination of the Forestry Sector." *Journal of Policy Analysis and Management*, (71:1), 40-61.
- Jacobson, M. 2001. "Taxes and Laws: Do They Change Landowner Behavior for the Better?" Unpublished, Pennsylvania State University. Available at <http://www.regional.org.au/au/infro/2001/jacobson.htm>.
- Jacobson, M., and M. McDill. 2003. "A Historical Review of Forest Property Taxes in Pennsylvania: Implications for Special Forestland Tax Programs." *Northern Journal of Applied Forestry* 20: 53-60.

- Joshi, S. 2007. "Nonindustrial Private Landowner's Characteristics and Their Forest Management Decisions." M.S. Thesis. West Virginia University.
- Kilgore, M. A., J. M. Schertz, S. A., Snyder, and S. J. Taff. 2007. "Family Forest Owner Perceptions and Attitudes: Minnesota's Sustainable Forest Incentives Act." A report to the Blandin Foundation, University of Minnesota.
- Klemperer, W.D., 1977. "Unmodified Forest Property Tax – Is It Fair?" *Journal of Forestry*, October, 650-652.
- Malme, J., 1993. "Preferential Property Tax Treatment of Land." Working paper, Lincoln Institute of Land Policy.
- Marquis, R.W. 1939. *Economics of Private Forestry*. McGraw-Hill. New York. 219pp.
- Miller, D., and R. Rose.1985. "Changes in the Urban Land Base and the Consequences for the Future of Forestry." *Investments in Forestry*. Ed. Roger A. Sedjo Westview Press. Boulder, Co. 246pp.
- Peck, M. 1929. "Farm or Forest in the West Virginia Appalachians?" *Journal of Farm Economics*, July (11), 422-435.
- Probert, T. 1999. "Reforestation Constraints, Experiences, Trends, and Needs: A Landowner's Perspective." Paper presented at A Technical Interactive Forum on Enhancement of Reforestation on Coal Mine Land, USDI Office on Surface Mining, March 23-24. Available at <http://www.mrcc.osmre.gov/PDF/Forums/Reforestation/Session%202/2-8.pdf>
- Rasmussen, B. 1994. *Absentee Landowning and Exploitation in West Virginia: 1760-1920*. University Press of Kentucky, Lexington, KY. 222p.
- Rathke, D. M. 1993. "An Evaluation of Minnesota's Timberland Property Tax Laws." M.S. Thesis, University of Minnesota.
- Rice, O. 1985. *West Virginia: A History*. University Press of Kentucky, Lexington, KY. 326p.
- Seldon, R. T. 1981. "Land Use Problems: An Economist's Perspective." *Toward a New Land Use Ethic*. Piedmont Environmental Council, Warrenton, VA. 90-96.
- Sprankling, J. G. 1996. "The Antiwilderness Bias in American Property Law." *University of Chicago Law Review*, (63:2), 519-590.
- USDA Forest Service. 2007. *West Virginia: State and Private Forestry Fact Sheet*. Accessed on March 18, 2008 at: http://www.na.fs.fed.us/ra/factsheets/wv_std.pdf.
- Wagner, J.E., C.J. Davis, D.E. Roczen, and L.P. Herrington. 2002. "Combining Zoning Regulations and Property Tax relief to Retain Forestland and Promote Forest Management." *Northern Journal of Applied Forestry* 19: 59 -67.
- White, D. E. 1987. "West Virginia Forest Land Value and the Property Tax." *West Virginia Forestry Notes*, May, 29-33.
- White, D. E. 1991. "The Property Tax in West Virginia: Adequacy, Legitimacy and Equity." Institute for Public Affairs, West Virginia University, Monograph Series No.4, Chapter 2. Available at <http://www.polsci.wvu/ipa/mono/html/mon4chap2.html>
- White, D.E. 1993. *West Virginia's Second Forest*. Miscellaneous Publication- Agriculture and Forestry Experiment Station, West Virginia University W.V. State Legislature. West Virginia Code § 11. "Taxation."
- W.V. State Legislature. West Virginia Code § 110. "West Virginia Legislative Rule, Department of Tax and Revenue, Division of Tax Series 1H; Valuation of Timberland and Managed Timberland."

W.V. State Tax Department, Research Division 2000. West Virginia Tax Expenditure Study: Expenditures for Special Business Taxes, Business License Taxes and Property Taxes. January. 242pp.

W.V. State Tax Department 1979-1995. West Virginia Tax Laws. Periodical.

CHOOSING WHAT TO BELIEVE ABOUT FORESTS: DIFFERENCES BETWEEN PROFESSIONAL AND NON-PROFESSIONAL EVALUATIVE CRITERIA

Roje S. Gootee¹, Keith A. Blatner², and David Baumgartner³

Abstract -- Interviews with 109 stakeholders revealed that many natural resource management professionals may not correctly anticipate how forest owners evaluate new forest management information. Using the qualitative “grounded theory” research method, we asked our interviewees to discuss their information sources, preferences, and reasons for preference. Most professionals chose and evaluated new information on the basis of established standards of scientific credibility such as peer review or the professional reputation of the individual(s) and institution(s) conducting the research or publishing the information. Most professionals expected forest owners would do the same. Forest owners with non-professional backgrounds, however, were often unfamiliar with or unimpressed by such credentials. Instead, many of these forest owners used a very different evaluative screen. Willingness to adopt information was greatly influenced by the forest owner’s social impressions of the individual(s) delivering it. When professionals pressed for an ‘expert to non-expert’ relationship or did not establish a mutually respectful interpersonal learning atmosphere, many forest owners resisted not only the information provider, but also the information delivered. We link these findings to adult learning theory, and demonstrate that the natural resource professionals most effective with forest owners were those who provided classic elements of a good adult learning environment. We conclude that an improved understanding of the fundamentals of the adult learning process can be expected to materially enhance the effectiveness of natural resource professionals in information exchange with forest owners.

INTRODUCTION:

A private forest owner’s ability to provide good forest management is closely linked to good information about forest ecology and stewardship. Additionally, where private forest practices are governmentally regulated, forest owners need to understand not only the regulatory policies, but also the social and ecological imperatives that drive them. Landowners who do not understand the rationale for regulations are less likely to willingly comply with them (Creighton and Baumgartner 2005). Consequently, natural resource professionals advising private forest owners need to foster an effective learning environment. To do so, professionals must understand the owners as well as the forests (Downing and Finley 2005, Cartmell *et al.* 2006).

¹ Rush Creek Ranch, P.O. Box 243, Long Creek, Oregon, USA 97856, Phone: 503-504-1177, rushcreek@hevanet.com

² Department of Natural Resource Sciences, Washington State University, P.O. Box 646410, Pullman, Washington, USA 99164-6410, Phone: 509-335-6166, blatner@mail.wsu.edu

³ Department of Natural Resource Sciences Washington State University, PO Box 646410, Pullman, Washington 99164-6410, Phone: 509-335-2964 baumgartner@wsu.edu

To help professionals assess their effectiveness as information providers, we studied the process of information exchange between private forest owners and natural resource management professionals in the State of Washington. Study participants were asked to describe and compare their various information sources, and to discuss their preferences and reasons for preference among them. This was part of a larger study of Washington's innovative "Alternate Plan option"⁴, a policy instrument developed by the State to render its Forest Practices Rules (WAC 222) more responsive to individual properties and owners. Alternate Plan applications are subjected to rigorous interdisciplinary, interagency review, and must be based upon sound ecological principles in order to earn approval. Forest owners using this fairly complex policy tool tend to be experienced at searching for forest management information, and rely upon a variety of information sources. They can therefore provide many insightful comparisons and observations about information providers.

Our study revealed a problem within the process of forest management information exchange: Forest owners often did not use the same criteria as natural resource professionals to determine the credibility of information. The failure to recognize this fact reduced the effectiveness of many professionals and institutions, because they did not correctly understand what many forest owners sought from their information providers. In this paper we examine this matter and suggest ways in which professionals can interact more successfully with forest owners.

STUDY AREA AND FOREST OWNERSHIP CONTEXT:

The study area included the entire state of Washington. Forests are integral to the state's culture and ecology, and comprise roughly half of its total land base. About 42 percent of the 22 million total forested acres are privately owned (WA-DNR 2005, Erickson and Rinehart 2005). Washington's thirty-four Native American tribes own approximately 6 percent, or 1.3 million acres, of these private forestlands. The industrial forest sector, consisting of about 60 ownerships (Erickson and Rinehart 2005), controls another 27 percent or about 2.5 million acres (Mason 2007). The majority of the private forests, however – approximately 67 percent or 5.5 million acres – are held by roughly 90,000 non-industrial owners (WA-DNR 2001). About half of these non-industrial forests (51 percent) are large parcels of 5000 acres or more. The remaining 49 percent are categorized as "small" forests. Most of the latter are less than 100 acres in size (Erickson and Rinehart 2005).

Private forest owners receive advice and/or regulatory supervision from the State Department of Natural Resources, Department of Fish and Wildlife, and Department of Ecology. The Federal Natural Resource Conservation Service often provides additional advice and assistance, primarily directed toward the protection of soils. In matters pertaining to federally listed threatened or endangered species, the United States Fish and Wildlife Service and/or National Marine Fisheries Service also become involved. Washington State University Extension is a popular non-regulatory institutional information provider. Forest owners additionally turn to consultants, forest ownership organizations, and peer networks for information.

⁴ The Alternate Plan option (WA RCW 76.09; 76.13; and WAC 222-12-040) permits forest owners to suggest management alternatives that differ from the State's prescriptive Forest Practices Rules (WAC 222), if the alternative can be expected to result in equivalent or better levels of protection.

RESEARCH METHOD:

The study relied upon the well-known “grounded theory” method of inductive, qualitative research (Glaser and Strauss 1999, Clarke 2005). Data are collected through in-depth, one-on-one interviews, enabling participants to elaborate upon the research topic in their own words. This develops a comprehensive, nuanced body of data that can effectively probe a complex subject. Sampling is purposive rather than random or statistical. New participants are sought until further interviews are producing only repetitive, rather than new, data (Glaser and Strauss 1999). The size and composition of the sample pool are therefore determined by the complexity of the research topic and the diversity of the emerging data.

The participants in our study were all involved in designing, revising, using, and/or administering Washington’s Alternate Plan Option. We interviewed 109 individuals, 103 of them in person, and 6 by telephone. They included non-industrial, industrial, and tribal forest owners, state and federal land management agency personnel, policy advisors, special interest group representatives, and consultants. As is typically the case in any forest management arena, many individuals tended to have diverse backgrounds and be active in more than one of these stakeholder groups. For example, a consultant might also be a forest owner, or an agency employee might also be a tribal member. Such persons were often able to be particularly insightful, because they had observed and experienced the process of information exchange from more than one standpoint. Most interviews lasted about two hours. The data were analyzed through the standard grounded theory technique of “constant comparison” (Glaser and Strauss 1999), supplemented by Clarke’s (2005) process of situational word- mapping. These techniques reveal emergent patterns and themes that form the foundation for new, grounded theories.

This paper addresses one grounded theory that emerged from our data: Many of the professionals we interviewed were less effective than they wished to be at convincing landowners to believe the information they brought them, and were puzzled by the apparent resistance of the forest owners. The forest owners, however, in their method of assimilating and adopting or rejecting new forest management information, tended to display quite predictable traits of adult learners. By more clearly understanding the basic principles of androgogy, i.e. the field of study related to adult education, natural resource professionals can present themselves and their information in a manner more likely to be appreciated and accepted by the forest owners they seek to influence.

The purpose of the paper is to introduce natural resource professionals to some of the fundamental principles of androgogy, so that they may better understand the adult learning process. Knowledge of these fundamentals will give professionals a valuable tool for improving their success in educating forest owners.

RESULTS:

We define ‘information providers’ as institutions, organizations, or individuals delivering what they consider to be authoritative information about forest management and stewardship to forest owners.

We identified five categories of information providers influencing the sampled forest owners:

1. *Institutions*, such as agencies, universities, and professional membership organizations, wherein nearly all persons producing and/or delivering information have professional, scientific training in natural resource management.
2. *Consultants*, either individuals or companies, who advise forest owners for a fee. All have relevant experience, and most have professional training and credentials.
3. *Organizational networks*, including forest owner groups, trade groups, or other special interest groups whose leaders, members, and outside information sources may or may not have professional backgrounds in natural resource management.
4. *Non-organized professional peer networks*, consisting of persons with professional backgrounds related to natural resource management.
5. *Informal networks*, including family, friends, or neighbors who may have extensive experiential forest management backgrounds, but who usually do not have professional training.

The forest owners in our sample fit three general ownership categories widely recognized in the literature: 1. Industrial timber companies, 2. Native American tribes, and 3. Non-industrial private forest owners (NIPF's).

We interviewed representatives of 12 industrial forest companies, 6 Native American tribes or tribal coalitions, and 39 NIPF's. The tribes were more lightly sampled than the other ownership groups simply because the tribes exercise much of their influence over the state's forest policies via the leaders of tribal coalitions, rather than as individual entities. A relatively few key individuals were therefore able to provide an overarching perspective. We interviewed representatives of only one timber investment management organization (TIMO), because only one such organization had used the Alternate Plan option at the time of our study. Because this TIMO employed professional staff to design and supervise their timber management activities, and because in terms of their manner of using the Alternate Plan option this company was functionally similar to the more traditional industrial timber companies, for the purposes of this study the TIMO was included in the industrial forest owner subgroup of our sample population.

We found that each forest ownership category played a different role, displayed distinctive patterns of behavior, and tended to elicit different responses from professionals within the process of information exchange.

Industrial timber companies typically employed professional foresters, and often other natural resource specialists as well. Although many company operations were conducted by other employees without professional natural resource backgrounds, the professional staff obtained and screened much of the new information used by their companies, and largely directed the design of field operations. The companies in our sample were also closely networked through a well-organized and politically influential trade organization, and displayed a strong sense of occupational community. Most relied upon this combination of in-house expertise, the trade network, and a peer network of consultants as their primary information providers. Institutional scientific sources, including professional associations, were also important.

Since the mid-1970's, Washington's industrial forest owners have proactively endorsed and participated in the state's unusual and highly collaborative approach to forest policymaking. Most said they now understood and accepted the regulatory outcomes. Most of the regulatory agency employees we interviewed agreed that the timber companies currently presented relatively few problems in terms of regulatory compliance. Consequently, the atmosphere of information exchange between employees of the timber companies and the regulatory institutions was generally positive. Although a hierarchical relationship was inherent due to the regulatory authority of the agencies, it was relatively low key. Information transfer often exhibited a fairly horizontal dynamic more characteristic of a peer-to-peer interaction. As one state employee summarized, "We don't see many problems from the timber companies. Most of them know what they need to do, and just want to keep things running smoothly."

In addition to managing their tribal forests, Washington's 34 Native American tribes significantly influence the state's forest policies through important treaty rights that were judicially revalidated in 1974⁵. Most tribes and coalitions employ professional natural resource management specialists to help them fulfill these responsibilities. They also conduct independent research. Many tribal members who do not have professional backgrounds have extensive traditional and experiential knowledge pertaining to forest management. Tribal members we interviewed indicated that the tribes generally rely most heavily upon institutional sources, particularly universities and peer-reviewed publications, as outside sources of information.

The process of information exchange between the tribes and most outside natural resource professionals was characterized by a relatively peer-to-peer relationship. Because the tribes are legally sovereign nations, they are not subject to state or federal forest management laws. Consequently, interactions between governmental institutions and the tribes lacked the hierarchical dynamic that was evident in institutional interactions with the regulated industrial and NIPF ownership groups. Many natural resource professionals also accorded the tribes peer respect due to the quality of their independent research and forest management practices. As one federal employee said, "The tribes are more and more impressive. We consider many of them pretty much on a par with the State agencies".

The non-industrial private forest owners (NIPF's) in our sample were a diverse group which included individuals, families, small collaboratives, small and large legal partnerships, homeownership organizations, and public destination facilities. The relationship between natural resource professionals and most of these NIPF owners was often markedly more 'vertical' or hierarchical than that between professionals and the industrial or tribal forest owners. Institutional professionals were much more inclined to believe that owners in this group were less well-informed than other types of owners. Consequently, professionals often approached NIPF's with an intention of 'teaching' them ways to improve their forest practices. Many

⁵ UNITED STATES of America, Plaintiff, Quinault Tribe of Indians on its own behalf and on behalf of the Queets Band of Indians, *et al.*, Intervenor-Plaintiffs, v. STATE OF WASHINGTON, Defendant, Thor C. Tollefson, Director, Washington State Department of Fisheries, *et al.*, Intervenor-Defendants. Civ. No. 9213 ; UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT OF WASHINGTON, TACOMA DIVISION; 384 F. Supp. 312; 1974 U.S. Dist. LEXIS 12291 ; February 12, 1974. (Commonly referred to as 'The Boldt Decision').

NIPF's, however, resisted this hierarchical expert-to-layperson approach, considering it inappropriately dismissive of their own experience with their land, and of their status as owners. For example, one forest owner said "The agencies want me to listen to them, but a lot of those folks sure don't seem interested in listening to me".

Some of the NIPF's in our sample were active tree farmers who had professional backgrounds in natural resource management, or very strong experiential backgrounds supplemented by regular advice from a professional consultant. We found that this subcategory described very different experiences in the process of information exchange than the other 'non-professional' NIPF's. The 'professional' NIPF's tended to feel competent to evaluate even complicated new forest management information independently. Often, they personally designed the management strategies for their forests. They tended to be very familiar with the intricacies of the regulatory system and confident in their own ability to navigate its required process of permit applications. The 'professional NIPF's' were also frequently involved as formal or informal leaders in state or national forest owner groups. They were generally closely networked and displayed a strong sense of occupational community, relying greatly upon one another for learning. Some were also politically active, acting as advisors in the forest policymaking arena. Consequently, they tended to be well-known to agency employees and policymakers as influential and/or respected stakeholders, and most were accorded a level of peer respect. An agency employee described one 'professional NIPF' by saying, "He's essentially been the voice of small-scale private forestry in this state. It's hard to imagine anyone doing more for that cause than he has".

Many NIPF's in our sample, however, did not have this type of strong professional background or regular professional support. The 'non-professional NIPF' subgroup differed in many important ways from the professionals, including in their information exchange experiences. They had far more diverse backgrounds and forest ownership goals. They exhibited notably less confidence in their own ability to evaluate forest management information independently. Few displayed an inclination to join forest owner organizations, network with very many other owners, or become involved in the political aspects of forest policymaking. Instead, most had found one or a few reliable individuals, either professional or non-professional, to whom they turned most often for information. "I can trust my consultant. I've worked with him off and on for years and I know he's got my best interests in mind. Plus, the agencies know he's good, and that makes my life a lot easier when it comes to dealing with the [regulatory] agencies", said one 'non-professional NIPF. Many of these non-professionals shunned information providers whom they did not personally know and trust. It was common for individuals in the non-professional group to describe frustration or resentment toward institutional information providers in general. In their opinion many of these providers seemed 'out of touch' with the circumstances of private forest ownership, and/or unconcerned about the forest owner's needs, wishes, or experience. Although many of these forest owners said they had very positive experiences and accepted information readily from particular, individual, institutional professionals, they often described these individuals as exceptions to their usual more negative experiences, and said they were much more reluctant to engage with most other institutional professionals who tried to provide them with information.

Divergent evaluative criteria between professionals and non-professionals

Natural resource management professionals, including the few NIPF's with professional resource management backgrounds, usually evaluated new forest management information based upon the

merits of the information itself, and/or its producers. They referred to widely accepted criteria such as “professional reputation”, “scientific credibility”, and “peer review”. Consequently, many professionals considered information *deliverers* to be largely interchangeable. In other words, professionals indicated that they would generally accept the same piece of information as readily from one deliverer as from another. Many thought forest owners would do the same. “The science speaks for itself. I don’t really understand why so many of them [the forest owners] want to keep arguing about it”, said one agency employee.

By contrast, most non-professional forest owners relied heavily upon their *social* impressions of an information deliverer when deciding whether or not to adopt the information they brought. Because the non-professional owners often did not feel confident in their own ability to evaluate the technical merits of the new information, they turned instead to the things they *did* feel competent to evaluate: the perceived attitude and intent of the individual(s) delivering the information. This subjective impression was often a significant factor in their decisions regarding which information to adopt or reject. Professional credentials and scientific rigor were therefore not usually their only or final decision points. Consequently, many of the ‘non-professional NIPF’s’ did not consider information deliverers interchangeable. Few were tolerant of a professional whom they did not believe respected their personal situation or their experience. When this empathy seemed lacking, they would turn to another advisor if possible, including, for quite a few, to informal or non-scientific sources. For example, one forest owner who described preferring to learn from a neighboring non-professional owner concluded, “At least he actually knows what it’s like to be me”.

Most consultants, Extension foresters, and a few agency employees closely predicted how forest owners would choose information and its deliverers. Notably, many of these same individuals were mentioned by name by forest owners as “good” information sources, indicating that these professionals not only recognized what was needed, but were largely successful at providing it.

Many other professionals, however, did not clearly understand what non-professional forest owners sought. These professionals often expressed frustration that forest owners seemed indifferent or resistant to the information that they provided, even information based upon what the professional regarded as indisputable science. This dichotomy underscores the importance of interpersonal relationships in the process of forest management information exchange, particularly when working with non-professionals who may be looking for a trusted guide, rather than just raw information.

DISCUSSION

The results of this study fit closely with principles that are well established in the scientific literature pertaining to androgogy, i.e. adult learning theory. Most forest owners we interviewed, in all ownership categories, displayed highly predictable traits of adult learners. Adult learners typically seek information providers who respect the learner’s experience, are open to non-hierarchical dialogue and a two-way exchange of ideas, are friendly and empathetic to the learner’s circumstances, and who can convince the learner that the new information is relevant and can lead to tangible improved outcomes (Knowles 1980,1984; Rogoff 1984, Vella 1994, Daniels and Walker 2001). The forest owners who said they had found satisfactory learning experiences described information providers who offered most or all of these elements. Owners who expressed dissatisfaction generally described professionals who had failed to embody these

qualities. Significantly, many forest owners who described feeling at ease in the overall environment of forest management learning were professionals themselves, or the rare laypersons whose experiential knowledge had earned them a level of peer status from the professional community. Institutional professionals more often interacted with this subset of forest owners as respected equals. Non-professional forest owners, by contrast, often felt as though many professionals were inclined to treat them as inferiors.

The literature on learning theory also highlights the importance that adults typically place upon experiential rather than merely instructional learning. Experiential learning is a cyclical phenomenon, rather than a 'snapshot' or isolated event. For example, Kolb's classic model identifies four important phases within the experiential learning process. The learner first engages in a period of "reflective observation", to determine if and why an issue or problem is important. They then proceed to a phase of "abstract conceptualization", and begin to envision ways to address the issue or problem. This is followed by a third phase of "active experimentation", in which the learner begins to test potential solutions. And lastly, through a fourth phase of "concrete experience", the learner applies their chosen solution(s), and may also use them as a catalyst for new, related learning (Kolb 1984, Daniels and Walker 2001). Individuals may pass through these phases at distinctly different paces, and may possess significantly different personal strengths within each phase, but will predictably need to progress through all four.

Hill and Clover, who are among the scholarly pioneers exploring linkages between the adult learning process and the changing human relationship with the environment, point out that "Environmental adult education is a new stream of adult education and is still very much a work in progress. This means that unlike other areas of adult education, materials on this topic are somewhat limited. Nevertheless, they do exist and are growing in numbers" (Hill and Clover 2003). Of particular interest is the literature on *transformative learning* (e.g. Cranton 2006). In contrast to the simple assimilation of a new piece of information, *transformative learning* profoundly changes the learner's perception of truth, and of himself or herself in relation to that truth. It may be defined as "... a process by which previously uncritically assimilated assumptions, beliefs, values, and perspectives are questioned and thereby become more open, permeable, and better validated" (Cranton 2006). Natural resource management professionals are often attempting to lead forest owners toward this type of transformative experience, because they are trying to persuade forest owners to abandon old perceptions and values that result in poor forest practices, and adopt a new and sometimes vastly different understanding of forests and of the human relationship to the environment. Finger (1989) contends that environmental educators should always be focused on fostering this type of learning. It may be hindered, however, by the conventional, hierarchical approach of an 'expert' treating a learner as 'non-expert', because the opportunity for open, reflective dialogue is crucial to transformative learning (Feinstein 2004). By contrast, there is mounting evidence that activists and educators who respect and channel the experiential knowledge of local residents and landowners, rather than resisting or resenting it, can actively promote transformative environmental learning (e.g. Kapoor 2003, Feinstein 2004, Walter 2007, Sumner 2008).

Our results indicated that most of the institutions in our sample had developed a fairly effective atmosphere for adult learning with the industrial and tribal forest ownership categories, wherein many forest owners are or employ professionals, or have respected experiential backgrounds.

Among NIPF's, however, where institutional professionals most often interact with layperson forest owners, the process of information exchange often left much to be desired. Non-professional forest owners frequently complained of a lack of the core elements of a good adult learning environment. They perceived a lack of respect and/or empathy from information providers, and a reluctance or unwillingness on the part of professionals to give credence to the viewpoints and experience of the forest owner. Our results also indicated that many professionals were bypassing the early phases of the experiential learning cycle; in other words, they often failed to convincingly explain the relevance of new concepts or regulations before requiring the forest owners to implement them. Given the fact that the vast majority of forest owners – over 90,000 in Washington alone – fall into this category of layperson, non-professional NIPF's, inadequacies in their learning experiences can be expected to have significant, negative consequences, both ecologically and socially.

The fact that so many professionals overlooked the importance of actively cultivating a positive learning environment may simply be attributable to the fact that it is relatively inherent in their own circumstances, and therefore taken for granted. Many natural resource professionals described their peer community as almost familial. The respect, acceptance, and situational empathy so integral to effective adult learning are often fairly commonplace in information exchanges between professionals. In particular, many of the consultants and land management agency employees we interviewed described this type of setting.

Additionally, professionals begin much of their new learning from a previously established educational background. For them, the learning of new forest management concepts tends to be incremental, rather than largely new or foreign as it may be to a non-professional. The newness of much of the information they need to learn implies that for non-professionals, the earliest phases of the learning cycle, in which they learn 'why' altered forest management strategies are appropriate and begin to decide to take action, are especially important. According to our study results, however, these early phases of the learning cycle are often the most neglected by institutional professionals who are attempting to educate forest owners. This is perhaps not surprising, because a professional's prior personal choice of natural resource management as a career implies that they have already passed through the early phases of the learning cycle and have accepted 'why' improved forest management is important. Because its relevance seems so obvious to them, they may neglect to realize that it may be less so to others.

Our study results, however, indicate that the failure by professionals to understand and purposively cultivate the elements of a positive learning atmosphere, and to also address all phases of the learning cycle with forest owners, can substantially reduce a professional's effectiveness in the process of information exchange. Among the forest owners in our sample, inadequacies in their learning environment led not only to misconceptions about forest ecology and management, but also to disillusionment with and resistance to many of the professionals and institutions advising them.

These results do not imply that regulatory institutions and other professionals do not provide valuable services, or that they are inherently limited in their ability to create a style of information exchange more appreciated and accepted by forest owners. What is needed is simply a realignment of institutional foci: Natural resource professionals need to be prepared to understand and address not only the needs of the forests, but also the forest owners whom they seek to inform and engage as better stewards. This does not mean that professionals must

necessarily develop close, ongoing relationships with all forest owners – a level of service that no institution could realistically provide. Except from their consultants, most of the forest owners we interviewed did not expect, or even desire, such a level of recurrent interaction. In fact, many forest owners only called upon institutional professionals when undertaking a regulated forest practice upon their property. Their relationship of information exchange with these professionals is often fairly brief. When forest owners did interact with these institutions, however, they sought, but often did not believe they found, what might best be termed “professional courtesy”. The cultivation of this type of atmosphere does not require complicated changes in institutional practices or staffing. It simply requires that professionals are themselves trained to recognize and cultivate the elements of an effective adult learning environment.

CONCLUSION

The contrast between the learning environment experienced by most natural resource professionals and that described by many non-professional forest owners was striking. Professionals typically were accorded what amounted to membership status among their peers, and a related level of collegial respect. Their employers often made opportunities, materials, and funding for learning readily available to them. New subjects were often closely aligned with the professional’s personal interests, i.e. the relevance of the material was already clear to them. In other words, many core elements that researchers have long identified as essential for effective adult learning – self direction, reciprocal respect between information providers and learners, situational empathy, praxis, and immediacy of applicability – tend to be largely inherent in the professional world (Rogoff 1984, Vella 1994, Daniels and Walker 2001).

Non-professional forest owners, by contrast, particularly among the NIPF group, often described a markedly different learning environment, one in which many of these key elements were lacking. They often were left with an impression of veiled disrespect from professional resource managers, particularly those from the regulatory agencies. Many of these owners said they found a collegial atmosphere and peer respect primarily within their forest owner organization and/or the circle of family and friends who acted as their ‘informal information providers’. The empathy they experienced among these providers often led forest owners to prefer them, even though some of the information obtainable from these sources might not be scientifically based or ecologically sound.

A number of excellent studies have examined forest owner preferences among information *delivery* formats such as printed materials, workshops, field visits, and internet or other media (Magill *et al.* 2004, Cartmell *et al.* 2006). Few, however, have examined forest owner expectations of individuals who *deliver* the information. Ours is the only study we have found linking forest management information transfer to the principles of andragogy, and revealing that forest owners expect professionals to provide not only information, but also the classic elements of a good adult learning environment.

Our findings illustrate that an important prerequisite for effective information exchange with forest owners is a readiness on the part of natural resource management professionals to understand what adult learners expect. As Haugen (2006) so aptly describes, educators need to facilitate a safe and non-critical atmosphere in which participants feel “called to action and motivated to learn”. Adult learners look for reciprocal respect from the educator, and ‘horizontal’ rather than primarily ‘vertical’ or hierarchical avenues for dialogue and information exchange.

They want pragmatic evidence that the new information ‘fits’ their circumstances, and a willingness on the part of the educator to understand the worldview of the learner (Knowles 1984, Vella 1994, Daniels and Walker 2001). Within our study sample, the professionals who failed to offer this type of learning environment were only sub-optimally effective at convincing forest owners to willingly adopt the information they recommended.

It can be expected that these results are not unique to the State of Washington. As Mellow (2005) concludes, “being professional” requires a different touch when dealing with rural laypersons in general. Professionals are trained to be convinced by empirical data and professional and scientific credentials. This paradigm is often foreign to rural communities, where residents customarily admire and adhere to a very different set of acceptance criteria based upon experiential learning, kinship, and neighborliness. Our study indicates that an important part of “being professional” when working with forest owners is the readiness to transition away from the hierarchical form and intellectual distance of the “expert/non-expert” relationship, and toward the more empathetic, open, and mutually respectful dialogue long recognized as preferred by adult learners. As one forest owner we interviewed summarized, “It’s not just about forests, it’s about people.”

LITERATURE CITED:

- Cartmell, D. Dwayne II, Chandra L. Orr, and Danna B. Kelemen. 2006. Effectively disseminating information to limited-scale landowners in the urban/rural interface. *Journal of Extension* Vol. 44, No. 1. 11pp. Accessed online on 11/08/2006 at <http://www.joe.org/joe/2006february/a5.shtml>
- Clarke, Adele E. 2005. *Situational Analysis: Grounded Theory After the Postmodern Turn*. Sage Publications, Inc.: Thousand Oaks, CA. 364 pp.
- Cranton, Patricia. 2006. *Understanding and Promoting Transformative Learning: A Guide for Educators of Adults*. Jossey-Bass: San Francisco, CA. 240 pp.
- Creighton, Janean H. and David M. Baumgartner. 2005. Washington State’s forest regulations: family forest owners’ understanding and opinions. *Western Journal of Applied Forestry* Vol. 20, No. 3. pp. 192-198.
- Daniels, Steven E. and Gregg B. Walker. 2001. *Working Through Environmental Conflict: The Collaborative Learning Approach*. Praeger Publishers: Westport, CT. 299 pp.
- Downing, Adam K. and James C. Finley. 2005. Private forest landowners: What they want in an educational program. *Journal of Extension* Vol 43, No. 1. 9 pp. Accessed online on 11/08/2006 at <http://www.joe.org/joe/2005february/rb4.shtml>
- Erickson, Ara and James Rinehart. 2005. Private forest ownership in Washington State. Background discussion paper prepared for *Saving Washington’s Working Forest Land Base* forum, University of Washington, College of Forest Resources, November 2004. 16 pp.
- Feinstein, Benjamin C. 2004. Learning and transformation in the context of Hawaiian traditional ecological knowledge. *Adult Education Quarterly* Vol. 54, No. 2, pp. 105-120.
- Finger, M. 1989. Environmental adult education from the perspective of the adult learner. *Convergence* Vol. 22, No. 4. Pp. 25-32.
- Glaser, Barney G. and Anselm L. Strauss. 1999. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Aldine de Gruyter: New York. 271 pp.

- Haugen, Caitlin Secret. 2006. Environmental adult educator training: suggestions for effective practice. *Convergence* Vol. 39, No. 4, pp. 91-106.
- Hill, Lilian H. and Darlene E. Clover, Eds. 2003. *Environmental Adult Education: Ecological Learning, Theory, and Practice for Socioenvironmental Change*. Issue 99 of the Jossey-Bass quarterly report series *New Directions for Adult Learning and Education*. Jossey-Bass: San Francisco, CA. 112 pp.
- Kapoor, Dip. 2003. Environmental popular education and indigenous social movements in India. Pp. 47-57 in *Environmental Adult Education: Ecological Learning, Theory, and Practice for Socioenvironmental Change*. Issue 99 of the Jossey-Bass quarterly report series *New Directions for Adult Learning and Education*. Jossey-Bass: San Francisco, CA. 112 pp.
- Kolb, David A. 1984. *Experiential Learning: Experience as the Source of Learning and Development*. Prentice-Hall: Englewood Cliffs, NJ. Kolb, D. A. 1984.
- Knowles, Malcolm S. 1980. *The Modern Practice of Adult Learning: From Pedagogy to Androgogy (2nd Ed.)* Ffollet: Chicago, IL.
- Knowles, Malcolm S. 1984. *Androgogy in Action: Applying Modern Principles of Adult Learning*. Jossey-Bass: San Francisco, CA.
- Luckert, Martin K. 2006. Has the myth of the omnipotent forester become the reality of the impotent forester? *Journal of Forestry* Vol. 104, No. 6., pp. 299-306.
- Magill, Daniel J., David W. McGill, and Rory F. Fraser. 2004. Refining outreach to woodland owners in West Virginia – preferred topics and assistance methods. *Journal of Extension*. Vol. 42. No. 4, 13 pp. Accessed online on 11/8/2006 at <http://www.joe.org/joe/2004august/rb5.shtml>
- Mason, Larry. 2007. Changing private forest management intensities: Western Washington. Discussion Paper 6, Final Report, Future of Washington's Forest and Forest Industries Study. 7 pp. University of Washington: Seattle, WA.
- Mellow, Muriel. 2005. The work of professionals: Doing the *gemeinschaft-gesellschaft* gavotte. *Rural Sociology* 70, 1; pp. 50-69; Research Library.
- Rogoff, B.L. J. 1984. *Everyday Cognition: Its Development and Social Context*. Harvard University Press: Cambridge, MA (as cited from Daniels and Walker 2001:84), Daniels, Steven E. and Gregg B. Walker. 2001. *Working Through Environmental Conflict: The Collaborative Learning Approach*. Praeger Publishers: Westport, CT. 299 pp.
- Sumner, Jennifer. 2008. Protecting and promoting indigenous knowledge; environmental adult education and organic agriculture. *Studies in the Education of Adults*, 02660830, Autumn 2008, Vol. 40, Issue 2, pp. 1-10.
- United States Department of Agriculture (USDA). 2000. 1997 resources inventory (Revised). Accessed online on 02/03/2007 at <http://www.nhq.arcs.usda.gov/NRI/1997/>
- Vella, Jane. 1994. *Learning to Listen: Learning to Teach*. Jossey-Bass: San Francisco, CA.
- Walter, Pierre. 2007. Adult learning in new social movements: environmental protest and the struggle for the Clayoquot Sound rainforest. *Adult Education Quarterly* Vol. 57, No. 3, pp. 248-263.
- WAC 222. 2001. Washington Administrative Code Chapter 222 “Forest Practices Rules” and Section 040, “Alternate Plans – Policy”, also Section 0401 “Alternate Plans – Process”. Printed Forest Practices Manual obtained from Washington State Department of Natural Resources; Olympia, WA.
- WA – DNR 2001. State of Washington, Department of Natural Resources Fact Sheet No. 01-119. Published by Washington Department of Natural Resources: Olympia, WA. 1pp.

WA – DNR 2005. State of Washington, Department of Natural Resources (WA-DNR). Survey of general forest conditions. Accessed on line 01/23/2007 at <http://dnr.wa.gov/htdocs/rp/forhealth/2005highlights/fhgencondinter.htm>

WA RCW. Washington’s Forest Practices Act. 2002. Chapter 76.09 “Forest Practices” and Chapter 76.13 “Stewardship of Non-industrial Forest and Woodlands”. Printed version obtained from Washington State Department of Natural Resources; Olympia, WA.

THE REVIVAL OF FIREWOOD USE IN QUEENSLAND, AUSTRALIA

Steve Harrison¹ and Jack Baynes^{1,2}

ABSTRACT--Wood fires were used widely for cooking in Australia, particularly in rural areas, up to the time of widespread electrification in the 1950s. Currently there is a resurgence in interest in use of firewood for winter home heating, driven in particular by increasing electricity prices and growing environmental consciousness, and reflected in Australia by the decision of the Commonwealth Government to sign the Kyoto Protocol in 2007. New stove technology has led to greater thermal efficiency and reduced emissions from woodfuel. Under current prices, production of eucalypt timber for firewood can compete strongly with production of sawlogs in terms of enterprise profitability. However, there have also been strong objections to extraction of woodfuel from native forests, where a 'lockup mentality' appears to dominate. This paper reviews the growing use of woodfuel internationally, and the perceived advantages and limitations relative to fossil fuels. A case study is reported of fuelwood use in south-east Queensland. Growing use of woodfuel is noted, but also mixed attitudes of government and environmentalists, and as yet limited financial benefit for tree growers.

INTRODUCTION

Growing concern over global warming and increasing interest in use of renewable energy have led to increased interest in use of renewable fuel sources. Historically, fuelwood has been a source of energy for heating and cooking, and it is logical that greater use of this relatively sustainable energy source should be revisited.

Woodfuel takes various forms, including chipped wood fuels, traditional log fuels and reconstituted fuels (pellets and briquettes), with chipped wood typically used for larger plants, pellets used for automated household central heating and solid wood for household space heating (Jones 2001). Jones further commented that in Scandinavia and parts of Europe, woodlogs are still the most common form of woodfuel, mainly because the technology and equipment for their production and use is readily available and reasonably well established.

Perhaps the most striking recent development in wood fuels has been the widespread use of wood pellets. These capture a very high percentage of energy from the wood source, compared for example with the energy losses in charcoal production and burning. As well, as noted by Jones (2001):

- wood pellets have consistent density and therefore even heat content, very low moisture content (5 to 10% of oven dry weight),
- the absence of dust, bark pieces and contaminants which are found in other wood fuels makes wood pellets a relatively 'clean' fuel,

^{1,2} School of Integrative Sciences, The University of Queensland, Qld. 4072, Australia

- there is a wide range of pellet burner units specifically designed for small modern domestic heating requirements, as well as a range of boilers and boiler conversions.

Growth in woodfuel use is particularly notable in European countries. In the UK, DEFRA *et al.* (2006, p. 1) noted the recent upsurge in woodfuel use, commenting ‘... why the recent upsurge in interest? With the drive for renewable energy in the UK woodfuel is experiencing a renaissance, providing an alternative to fossil fuels. ... woodfuel can play a major part in UK renewable energy production’.

Denmark – which suffers from a lack of renewable energy sources – first used combined heat and power (CHP) technology in 1903 – based mainly on oil – and in the 1960s developed industrial waste as an energy source for direct heating (DH) (Larsen, undated). Use of biofuels was triggered by the oil crises of 1973-74 and 1979-80, when Denmark was depending on imported oil for more than 90% of its total energy supply. According to the Danish Energy Agency (2008a), 16 centralised and approximately 415 decentralised plants supply public heating in Denmark, transporting heating to customers by means of direct heating. One in three of the decentralised district heating plants and one in seven of the decentralised CHP plants use environmentally friendly fuels (straw, wood chip, wood pellets, biogas or waste), the remainder using natural gas (Danish Energy Agency 2008b). The Danish District Heating Association reported that in Denmark ‘1.5 million households are connected to collective district heating networks. Some 60% of the Danish population is thus kept warm by district heating’ (DDHA, 2009). Renewable energy in the form of municipal solid waste, straw, wood and biogas has become the major fuel source for district heating. More than 600,000 of Denmark’s 2.5 M houses receive DH from a biomass plant (Larsen, undated).

DH and CHP based on biomass have been promoted in Denmark through economic incentives (subsidies, taxation, investment grants) and regulation (governmental and municipal powers to regulate power stations and zoning of district heating). In designated zones, DH was often allowed to operate as a local monopoly and avoid waste of investment and energy, exempted from competition from natural gas or electric heating

In Germany, favourable governance structures (i.e. strong support by national and regional policies), rising prices for fossil energy sources, and co-operation of committed individuals and groups, have contributed to the successful establishment of a new bioenergy industry (Plieninger *et al.* 2008). As noted by Larsen (undated), use of DH/CHP and renewable energy is the single most important measure in fulfilling EU commitments to the Kyoto Protocol.

Bhati (2001) noted the estimate of firewood consumption by Australian households in 1999-2000 at about 5 million tonnes, or 6-7 million (partly dry) tonnes when industrial firewood is included. Likewise, according to (Noble 2008, p. 118), ‘The current industry is estimated to consume 6-10 million tonnes of firewood in Australia per year, which is more than the 4.8 million tonnes of hardwood chips exported in 2006-07’. In both Australia and Europe therefore, woodfuel and bioenergy continue to supply a major – and in some situations, expanding – part of household heating and power needs.

The next section of this paper examines the growth in use of woodfuels globally, and particularly in Europe. Current perspectives in use of timber from native forests and plantations in Australia

are then discussed. A case study of the growth in woodfuel use in the subtropical region of south-east Queensland is then presented. Concluding comments follow.

ADVANTAGES OF WOODFUEL USE RELATIVE TO OTHER ENERGY SOURCES

Various advantages of using woodfuel as an energy source have been noted in the literature, e.g. Ecoenergy (undated), DEFRA *et al.* (2006), Renewable Heat and Power Ltd (2006). One of the advantages is the wide availability of woodfuel. Ecoenergy (undated) argued that biomass, and particularly wood, is the most widespread form of renewable energy in continental Europe, noting its frequent use to provide hot water and central heating to homes, schools and hospitals. Another advantage is the reduced greenhouse emissions resulting from firewood use. The argument in favour of using firewood is that when burnt, wood merely emits back into the atmosphere the CO₂ which was taken up when the trees grew, less the emissions involved in the growing, processing and transport of the timber.

The cost-effectiveness of woodfuel can also be high. Ecoenergy (undated) argued that wood is now less costly in Europe than oil or gas, and that installing a woodfuel boiler for a large building may have a payback period of only of 2 to 6 years against continuing to operate oil heating or 6 to 12 years against continuing to use gas. Similarly, Renewable Heat and Power Ltd (2006) in the UK argued that woodfuel is 'one of most cost-effective ways of meeting the 10-20% renewables target – many studies show it is 2 to 10 times cheaper than other options'. In Denmark, about 98% of all district heating consumers pay less for their heat compared to heat from household-based oil boilers, and 92% of DH consumers pay less for their heat, when compared to individual natural gas boilers (Larsen undated). In Australia, Noble (2008) commented that firewood can be a low-cost by-product of logging or road clearing.

In terms of investment in rural economies, harvesting woodfuel can provide a market for timber not suitable for other purposes, and wood fuel plantations can provide a new short-rotation forestry enterprise. Alternative Technology at Home (undated) reported that in Suffolk fast-growing willows provide a woodfuel source. The trees are planted as 1 m long sticks, which can be coppiced and harvested for fuel every 3 to 4 years. In tropical developing countries, forestry plantations are also being developed as biofuel sources. For example, Kadda *et al.* (2008) discussed forestry nurseries for seedling production for fuelwood plantations in the Philippines.

Another argument in favour of woodfuel use concerns waste disposal. Sawdust has often proved a difficult waste product disposal item for sawmills, emitting nuisance smoke and carbon dioxide when burnt. Using sawdust to make wood pellets converts this waste into a valuable commercial product. Further, as argued by DEFRA *et al.* (2006), incorporating reclaimed clean wood into woodfuel systems helps to reduce the burden on landfill. In terms of energy security, in countries with heavy reliance on oil imports including Denmark and the UK, domestically grown woodfuel is regarded as making an important contribution to energy supply. In terms of lifestyle, particularly for wood stoves and open fireplaces, the burning of woodfuel can provide a pleasant indoor ambience, particularly in times of cold and wet weather. Yet a further advantage could be the reduction in bushfire damage and loss of life. In the Australian context, fallen timber was widely considered to contribute to 7 February 2009 bushfire disaster in Victoria. Vegetation management laws made collection of fallen timber, including along roadsides, illegal.

A number of practical issues arise concerning practical aspects of installing and operating woodfuel burners, relative to use of fossil fuels, as reviewed by Jones (2001). More space is needed for the installation of heating systems and fuel storage. Poor storage can cause health risks and operational problems. It is necessary to learn the skills for safe and efficient use of woodfuel heaters. A continuing woodfuel supply and adequate woodfuel quality and suitability for the burner equipment are necessary. Relative to oil burners, more time is involved in maintaining smooth running of the heating systems, e.g. cleaning and emptying ashes.

ENVIRONMENTAL ASPECTS IN THE USE OF WOOD FUEL

Reduction in 'carbon pollution' and air pollution

When compared with use of fossil fuels for home heating and cooking, woodfuel appears to have a clear advantage. As frequently reported, the burning of woodfuel releases the carbon dioxide which has been sequestered in the growing trees. This rather simplistic view of course ignores the carbon costs of growing, harvesting and transporting trees (reducing the benefits), and the length of time in which carbon is tied up in growing trees (increasing the benefits), as well as release of other gases and particulate emissions in wood burning. New technology for the burning of solid wood, woodchip and pellets has substantially reduced the emissions of both particulates and carbon dioxide. However, Baynes (2009) sounds a note of caution in commenting that if technology capable of reducing emissions from coal-fired power stations is developed successfully, this technology would negate the claim that firewood is potentially less polluting than use of electricity for heating and cooking, generated in coal-fired power stations.

Biodiversity impacts

Commercial utilization of fuelwood can have both positive and negative biodiversity impacts. DEFRA *et al.* (2006, p. 3) argued that 'managing forests for woodfuel also benefits a wide range of other forest functions such as biodiversity'. Similarly, Loyn *et al.* (2007) cited by Noble (2008, p. 118) argued that plantations including those for fuelwood 'can make a positive contribution to biodiversity conservation and hence sustainable landscapes' and that these contributions 'can be enhanced through measures such as planting blocks, planting close to remnants, retaining remnants within the plantation, harvesting in patches to retain connectivity and including some rough barked species and understorey', noting particularly the potential biodiversity benefits in the medium to low rainfall zones. However, she also noted that major degradation of the Victorian Box Ironbark Woodlands and their associated habitat and biodiversity values was occurring due to unsustainably harvested firewood for home heating and cooking. There appears to be a strong case for establishment of firewood plantations in areas of less than about 700 mm annual rainfall, using native species with high timber density, and including some understorey plants, particularly in salinity recharge areas. Noble (2008) noted firewood plantations have been established in Victoria and South Australia over the last 20 years.

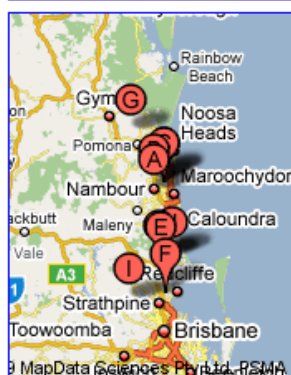
Unightly storage in woodfuel depots

Noble (2008) noted the importance of firewood depots in the supply chain, observing the situation in Victoria where local government collected fallen timber after storms, and made it available to concession card holders. Baynes (2009, p. 24) argued that 'it is unlikely that councils would tolerate operators storing wood in the large firewood dumps, as was the custom in the 1950s', and storage constraints are an impediment to continuity of activity for fuelwood producers in Queensland where demand is highly seasonal.

CASE STUDY: INCREASING WOODFUEL USE IN THE MALENY DISTRICT OF SOUTH-EAST QUEENSLAND

The Sunshine Coast Hinterland on the Blackall Range in south-east Queensland has a pioneering history of timber-getting, and has retained some examples of native rainforest, although of this area was cleared for dairying in the late 1800s. During the last 50 years, the dairy industry has contracted sharply, and in the last 20 years there has been extensive planting of rainforest cabinet timbers and eucalypts. The town of Maleny has an annual woodcraft exhibition called Maleny Wood Expo: From Chainsaw to Fine Furniture, with activities including mobile saw and chainsaw demonstrations, woodworking demonstrations, and displays of woodworking tools. A screenshot from a Google search (Figure 1) indicates the case study area (about 100 km north of the Queensland capital of Brisbane), together with some fuelwood suppliers.

[Local business results for firewood near Maleny QLD, Australia](#)



- A. [Fire Wood to Burn](#) - [maps.google.com](#) - +61 7 5478 9508 - [More](#)
- B. [Sunshine Coast Firewood Industries](#) - [maps.google.com](#) - +61 439 499 555 - [More](#)
- C. [Coastland Arbor Services](#) - [maps.google.com](#) - +61 7 5446 6373 - [More](#)
- D. [Biogroup](#) - [maps.google.com](#) - +61 7 5446 6373 - [More](#)
- E. [Caboolture Firewood Depot](#) - [maps.google.com](#) - +61 7 5495 4294 - [More](#)
- F. [Statewide Tree Management](#) - [www.statewidetreemanagement.com.au](#) - +61 1300 368 859 - [1 review](#)
- G. [Kelly's Timber Services](#) - [maps.google.com](#) - +61 7 5485 2703 - [More](#)
- H. [Caboolture Tree Service](#) - [maps.google.com](#) - +61 7 5429 5194 - [More](#)
- I. [A 1 Split & Dried Firewood](#) - [maps.google.com](#) - +61 7 5546 4546 - [More](#)
- J. [Angry Ant](#) - [maps.google.com](#) - +61 1800 806 241 - [More](#)

[More results near Maleny QLD, Australia »](#)

[Maleny Wood Expo - Tree World](#)

"[Maleny Wood Expo - from chainsaw to fine furniture](#)" 2nd and 3rd May 2009 ALL ... Burl Wood, P.L., [Firewood and Wood Working](#), 25, 10th October 2008 07:35 PM ...

[www.treeworld.info/f6/maleny-wood-expo-7426.html](#) - 61k - [Cached](#) - [Similar pages](#)

Figure 1. The study area and local firewood merchants. Source: Google response to keywords 'firewood' and 'Maleny'.

Relative to coastal areas, the tableland is wet (annual precipitation over 200 cm) and cool (with an elevation of 400-500 masl), and has substantial areas of remnant wet sclerophyll (mainly eucalypt) forest which are a source of firewood. Back in the 1950s, many residents outside the town (mainly farmers) did not have electricity connection, and wood stoves were the most common form of cooking and heating. In the last few years, with sharply increasing electricity tariffs and the attractiveness of wood fires, there has been a resurgence in the use of woodfuel. At present, there is no general ban on the construction of open fireplaces and their use in new homes in south-east Queensland, and new and efficient enclosed woodstoves are increasingly used. In a recent consultancy report, Baynes (2009) examined the production, marketing and sustainability implications of firewood use in the area; this case study draws extensively from the Baynes report.

The firewood industry is represented by The Firewood Association of Australia which acts as the certifying body for an industry 'Voluntary Code of Practice for Firewood Suppliers'. The association lists 100 members or affiliate members throughout Australia, only five of which are located in Queensland. Many other firewood wholesalers and retailers exist, the 'Yellow Pages'

on-line directory listing 45 firewood retailers in the Greater Brisbane area alone (Yellow, undated).

Data collection and some industry observations

To investigate firewood use, eight telephone interviews were undertaken with firewood retailers in Brisbane, Sydney, Melbourne and Gympie. Also, two personal interviews were undertaken with the proprietors of the Queensland sawmills ‘Mary Valley Timbers’ in Dagon and ‘Robertson Bros’ in Gympie. Most interviewees were willing to divulge only basic information including sale price, delivery charge, firewood species and moisture content (as detailed in Table 1). Both Melbourne dealers claimed to sell only red gum, and most firewood is classified as ironbark in Sydney and Brisbane, although it is probable that in all three cities, classifications are little more than generic trade-names.

The industry appears to operate at four levels:

- Sawmills sell firewood sourced from slovens² or defective logs and slabs which cannot be re-sawn into saleable lumber (Table 2).
- Small independent operators cut and supply firewood and ancillary products, (e.g. fence posts) to order. When demand is heavy in winter, output of single-operator businesses is likely to be no more than approximately 2-3 m³ of wood, cut, snigged, split and loaded per day (Morris 2008). In summer, firewood demand in Queensland is virtually nil and for those suppliers without a storage depot, operations virtually cease. Business names for smaller firewood retailers often indicate that firewood is no more than an ancillary product (e.g. ‘ABC Turf Supplies’, ‘Coastland Arbor Services’).
- The larger firewood retailers sell wood from a depot as well as supplying retailers. Wood supplied to retailers is often sold in 15-20 kg bags or shrink-wrapped plastic.
- Some retailers, notably hardware suppliers and service stations, sell firewood as an ancillary product, often in a front-of-shop location.

The price of firewood varies with specifications of the wood from *dry* (old previously fallen or ringbarked wood), to *green* (cut from newly felled trees) and with species (which are notably ironbark, redgum and *mixed* hardwoods).

Equipment required to produce firewood and the profitability of firewood businesses

For operators with access to sufficient volumes of dry wood who sell in wholesale markets, anecdotal evidence indicates that the return from firewood harvesting can be large, with a monthly turnover for a two-man operation of the order of \$60,000 for dry, split firewood trucked to Sydney. For this scale of operation, equipment consists of a truck, chainsaws, a loader to snig (drag) and load wood, and a hydraulic splitter (the only specific-use item of equipment) to split chainsawn *rounds* of into smaller pieces. Hydraulic splitters have been used in forestry for many years and consist of a hydraulic ram to which is attached a steel wedge or blade. The wedge is forced into rounds of wood, along the grain of the wood, which splits easily unless it has

² ‘Sloven’ is the industry name given to the angled cut or ‘scarf’ which is cut at the base of a tree to ensure directional falling. When logs are squared off in a sawmill, the sloven becomes the waste section of log, which is often used as firewood.

interlocked grain³. For smaller operations, rounds may even be split with a *Canadian splitter* (an axe with a very broad angle to the cutting edge). Blocks of wood are then loaded, by hand or with a conveyor belt, onto a truck for transport. Because most of the equipment is not task-specific, firewood collection is attractive to those businesses which already use these items (e.g. tree loppers or surgeons).

Table 1. Retail price of firewood by species and whether dry or 'green' wood

Supplier	Delivery location	Species	Moisture class	Price delivered (\$/tonne) ^a
Cheltenham Firewood Supplies	Urban Melbourne	Red gum	Dry ⁴	270
PR Firewoods	Major towns throughout Qld	Red gum, ironbark	Dry	250
Firewood Supplies	Urban Brisbane	Ironbark	Dry	200
Mac and Me Firewood	Urban Sydney	Ironbark	Dry	170
ABC Turf Supplies	Urban Brisbane	Spotted gum	Green ⁵	130
Skeet and Julie	Sunshine Coast	Mixed hardwoods	Green	120
Flaming Hot Firewood	Urban Melbourne	Red gum	Green	110
Coastland Arbor Services	Sunshine Coast	Mixed hardwoods	Green	90 ^b
Mary Valley Timbers	Gympie	Mixed hardwoods	Green sawmill off-cuts	45 ^b
Robertson Bros Sawmills	Gympie	Mixed hardwoods	Green sawlog edgings	30 ^b

a. Loose firewood is often sold by the *load*, a load often being approximately equivalent to a ton.

b. Timber not delivered.

Approximate costs of contract labour and equipment for a hypothetical operation were provided by Morris (2008) and are described in Table 3. A single operator, operating in flat terrain may produce 2-3 m³ of firewood per day. Snigging costs increase with terrain steepness, and haulage costs increase with distance travelled. With a retail firewood price of \$150 per m³, the profit per day may be small once operating expenses and transport are taken into account. Hence, these businesses may be attractive mostly for owner-operators who enjoy working in the outdoors and for whom there are few other work opportunities.

If small diameter logs are used, the cost of splitting may be avoided, but falling and snigging costs escalate dramatically. Despite the existence of large areas of small-sized spotted gum

³ A recent lightweight version of a hydraulic firewood splitter was exhibited at the annual Goulburn Vakkley (Victoria) agricultural field day.

⁴ 'Dry' firewood is regarded by the industry as being cut from trees which have been dead for some years.

⁵ 'Green' firewood is regarded in the industry as any wood which has not come from dead, seasoned timber.

regrowth, none of the operators interviewed cut small-sized trees. Interviewees responded that the royalty to landowners for firewood was likely to be not more than \$20 per ton (Table 2), consistent with the view of Noble (2008) of low returns to tree growers. The main advantage to landowners from firewood collection is to facilitate pasture improvement.

Table 2. Approximate firewood production cost by a small owner-operator

Operation	Cost per ton of firewood (\$)	Comment
Royalty to landowner	15	Variable
Fall and snig trees	30	Higher on steep terrain
Cut into rounds and split into firewood	25	Cut and split to length
Haul to a depot (nominal 60 km haulage distance)	30	8 tons/load
Haulage – Maleny to Melbourne	120 approx	20 tons/load
Haulage – Maleny to Sydney	80 approx	20 tons/load

Packaged firewood

Enquiries to PR Hardwoods, a wholesaler of packaged firewood, revealed that the wholesale price of bagged or plastic shrink-wrapped fire wood is currently \$500 per ton, with a minimum order being one pallet of wood (600 kg). For this company, the price of packaged firewood (\$500 per ton) is exactly double the price of loose firewood (\$250 per ton). Using \$500/ton as a wholesale price, the retail price charged by Bunnings Warehouse and the Shell Service Station (Table 3) is low, being a mark-up of only \$124 or \$170 per ton, respectively. However, the price charged by the BP service station (Table 4) is a mark-up of 100%.

Table 3. Wholesale and retail price of split, dry bagged firewood at three locations in Queensland

Supplier	Price per ton (\$) as 20 kg or 16kg bags
<i>Wholesale</i>	
PR Firewoods	500 (delivered)
<i>Retail</i>	
Bunnings Warehouse	624
BP Service Station (Noosa Heads)	1000
Shell Service Station Brisbane	670

Harvesting of firewood from native forests in Queensland

In Queensland, prior to the introduction and gradual enforcement of the *Vegetation Management Act (1999)* uncontrolled broadscale land clearing resulted in large quantities of firewood being sold in Sydney. Most of the wood sold by Sydney's big firewood companies came from the ironbark and box woodlands of inland Queensland (Cox 2001).

With the cessation of broadscale land clearing, firewood is now sourced on private land from dead trees which have been killed as part of pasture improvement programs, or as a by-product of logging. The Department of Environment and Resource Management (DERM) permits firewood collection from state forests, but only from trees which have fallen to the ground, either naturally or as a result of logging. The demand for licenses to collect firewood in south-east Queensland is low because the volume of firewood is insufficient for commercial firewood

collectors. For small-scale collectors, Workplace Health and Safety and Environmental Management System requirements act as an impediment (Petersen 2008).

AUSTRALIAN GOVERNMENT ATTITUDES TOWARDS FIREWOOD USE

None of the Brisbane, Sydney or Melbourne city councils have prohibited the use of solid fuel heaters (SFH). However, the attitude of government at all levels is almost overwhelmingly negative. The position of the Australian Greenhouse Office is that SFH users should use only dry, seasoned wood to minimise smoke pollution, and should consider switching to another heating option. The office advises that greenhouse gas emissions from heaters is lowest for natural gas or electric reverse-cycle air conditioners, and most (by a factor of about 4) for open fires (Australian Greenhouse Office 2008).

Even in the colder southern state of Victoria, the use of SFHs is discouraged, the state Environmental Protection Agency (EPA) advising that ‘smoke from wood heaters and open fireplaces is a significant source of air pollution in Victoria during autumn and winter months’ (EPA 2006). The City of Sydney council is also opposed to the use of SFHs. For example, the Development Control Plan for medium density residential development states that the council aims ‘To encourage and recognise building design that encourages the use of cleaner energy sources by not supporting the utilisation of solid fuel heaters such as wood burning heaters or stoves’. In addition the council offers advice that poorly operated SFHs can also release particles, dioxins and volatile organic compounds which are potentially toxic and detrimental to health’ (City of Sydney 2007).

A similar attitude is expressed by the Brisbane City Council in advice to home builders:

Wood-burning heaters and fireplaces cause indoor and outdoor air pollution and can attract fines if they cause a neighbourhood smoke or odour nuisance. Wood-burning heaters are not recommended. If you like the look of wood heaters, consider a gas imitation heater or fireplace (Brisbane City Council, undated).

In Victoria, the installation and maintenance of solid fuel heaters is governed by Australian and New Zealand Standards AS/NZS2918:2001 and AS/NZS4013:1999 (Plumbing Industry Commission 2006), manufacturers’ recommendations, Council by-laws and EPA regulations. Similar installation requirements apply in Queensland.

DISCUSSION

The argument in favour of firewood is that if firewood displaces fossil fuels, sustainably managed forests and plantations have a dual benefit because they are effectively carbon neutral and the wood biomass is used to generate energy (Hamilton 2008). Also, wood which is not otherwise saleable from natural forests or plantations can be utilized for energy generation. When burnt at a fast rate in modern wood heaters, particulate pollution is much reduced, but this eliminates one of the main advantages of older slow combustion heaters – of keeping houses warm by burning slowly overnight. Disadvantages are the high cost of harvesting small logs or trees, possible wildlife habitat destruction and a need to dry wood before it is burnt. It may also not be practical to recover firewood from road-clearing operations or as a by-product of plantation clear falling. However, the equipment required to process firewood is simple and not unduly dangerous or uncomfortable to operate, compared with other extractive or rural

industries. Although demand is highly seasonal and this influences the annual period of operation for smaller operators, firewood wholesaling and retailing provides an adjunct activity to many businesses which sell firewood in association with other items.

While other sources of energy are available in Australia, one of the arguments in support of firewood – that it is carbon neutral compared with coal – may fail if new technology is successful in sequestering carbon from new and existing coal-fired electricity stations. The recent high volatility of oil prices in 2008 and 2009 indicates that in Australia the ability of fuelwood to compete with oil-based energy resources may increase, particularly if oil prices do not revert to the low levels of 2007. The position of Australia as a comparatively energy-rich nation may be compared with Europe, particularly Denmark. In Australia, fuelwood use has been skewed towards use of dry, dense eucalypt logs and the scattered nature of this resource has favoured small, almost itinerant, operators. In Europe, particularly Denmark, high energy costs have fostered the use of woodfuel in a manner which is unknown in Australia.

It is paradoxical that in Australia where energy usage is increasingly monitored and businesses are required to determine their ‘carbon footprint’, government regulations discourage a renewable resource like fuelwood and consequently further discourage the development of technology which may enable it to compete with other energy sources. The fuelwood industry in Australia may be described as being alive, operating efficiently, and supplying the needs of those people who prefer the ambience of a wood fire to electric, oil or gas heating. It can only be hoped that the technology which has enabled part of energy-poor Europe to supply their energy needs may be replicated in Australia.

REFERENCES

- Australian Greenhouse Office (2008) Home heating and cooling. Department of the Environment, Water, Heritage and the Arts. Canberra, ACT <http://www.environment.gov.au/settlements/gwci/heat.html>. Accessed 8 October 2008
- Baynes, J. (2009), A scoping study into the potential for multi-purpose planted forests in the Blackall Ranges, draft version, School of Integrative Sciences, The University of Queensland, Brisbane.
- Brisbane City Council (undated) Sustainable home checklist for houses: sustainable home desirable criteria. http://www.brisbane.qld.gov.au/BCCWR/environment/documents/SUSTAINABLE_HOUSE_PART1-5.PDF?xml=/BCC:PdfHitXml:921424733:svDocNum=1. Accessed 8 October 2008
- City of Sydney, (2007) Technical manual EMI-9 solid fuel heaters. Draft ecologically sustainable development: development control plan. <http://www.cityofsydney.nsw.gov.au/Council/documents/OnExhibition/ESDRatingTool/EMI-9%20Solid%20Fuel%20Heaters.pdf> Accessed 5 October 2008
- Cox A (2001) Sydney’s firewood linked to Qld Land clearing. Media Release. 28 April 2001. National Parks Association of NSW. <http://dazed.org/npa/press/20010428firewood.htm>. Accessed 6 October 2008
- DDHA (Danish District Heating Association) (2009), untitled, <http://www.fjernvarmen.dk/In%20English.aspx>, accessed 26 April 2007.
- Danish Energy Agency (2008a), Basic Facts on Heat Supply in Denmark, <http://www.ens.dk/sw20278.asp>, accessed 14 April 2009.

- Danish Energy Agency (2008b), Large and small scale district heating plants <http://www.ens.dk/sw14615.asp>, accessed 14 April 2009.
- DEFRA, Forest Research and Forestry Commission (2006), 'Woodfuel is news again', Forest Research Farnham, Surrey, available at www.biomassenergycentre.or.uk.pls/portal/, available at 25 April 2009.
- Ecoenergy (undated), Wood Fuel Heating in the South East, <http://www.naturallight.org.uk/Case%20Studies/Econergy%20Introduction.pdf>, accessed 25 April 2009.
- EPA (Environmental Protection Agency) Victoria (2006a) Wood heaters, open fireplaces and air quality. <http://www.epa.vic.gov.au/air/woodheaters/default.asp>. Accessed 5 October 2008
- Ferguson M, Wilson G (2008) Queensland government media release, 14 November 2008.
- <http://www.callideoxyfuel.com/LinkClick.aspx?fileticket=eVPV3%2B0x9Xg%3D&tabid=88> Accessed 13 December 2008
- Forestry Commission (c2008), A woodfuel strategy for England, , <http://www.greenspec.co.uk/documents/energy/fce-woodfuel-strategy.pdf>, accessed 25 April 2009.
- Hamilton L (2008) Firewood and Woody Biomass and their Role in Greenhouse Gas Reduction [http://www.dpi.vic.gov.au/DPI/nreninf.nsf/v/883E47E02E95C2B1CA2574330080E54A/\\$file/Firewood_and_Wood_y_Biomass_and_their_Role_in_Greenhouse_Gas_Reduction.pdf](http://www.dpi.vic.gov.au/DPI/nreninf.nsf/v/883E47E02E95C2B1CA2574330080E54A/$file/Firewood_and_Wood_y_Biomass_and_their_Role_in_Greenhouse_Gas_Reduction.pdf). Accessed 14 November 2008
- Harrison, S.R., Sharma, P.C. and Lamb, D. (1994) Progress in farm forestry in the Obi Obi Valley. Paper presented to the Farm and Community Forestry Seminar, Dorroughby Field Studies Centre, Subtropical Farm Forestry Association, Dorroughby, New South Wales.
- Jones, D.H. (2001), A layperson's guide to efficient, modern production and use of small-scale woodfuel systems, Forestry Commission, Forest Research, Technical Development Branch, Wales, <http://www.ecodyfi.org.uk/energy/DyfiEcoWdFfinl.htm>, accessed 14 April 2009.
- Kadda, A.S., Venus, A.M., Lataza, D.B. and Solis, M.R.E. (2008), 'Operational Effectiveness of Centralized Nursery for Small-scale Forestry in San Carlos City, Negros Occidental, the Philippines: Lessons Learned in Seedling Production for Commercial Energy Crop Plantations', *Small-scale Forestry*, 7(3-4): 319-331.
- Larsen, I. (undated), Renewable energy in district heating in Denmark, <http://dbdh.dk/images/uploads/pdf-renewable-energy/side4-5.pdf>, accessed 12 March 2009.
- Loyn R.H., McNabb, E.G., Mcacak, P. Noble, P., 2007. Eucalypt Plantation as habitat for Fauna in Rural Landscapes: developing appropriate designs for enhancing their values. RIRDC, Canberra. Report in production.
- Morris W (2008) Sawmiller, Mary Valley Timbers, Dagun. Personal communication 15 September 2008
- Noble, P. (2008), 'Forests for Bioenergy: Markets and Resources for Firewood in South East Australia', Proceedings of the Australian Forest Growers National Conference, Forestry for a Better Future: Climate, Commerce and Communities, 20-22nd October, 2008, Albury-Wodonga, pp. 117-121.
- Petersen B (2008) Product Sales Officer, Queensland Department of Natural Resources and Mines. Personal Communication, 9 September 2008
- Plumbing Industry Commission (2006) Technical solutions 7: mechanical services http://www.pic.vic.gov.au/resources/documents/7._ms_solid_fuel_heaters.pdf. Accessed 19 September 2008

Plieninger, T., Thiel, A., Bens, O. and Hüttl, R.F. (2008), 'Pathways and pitfalls of implementing the use of woodfuels in Germany's bioenergy sector', *Biomass and Bioenergy* Volume 33, Issue 3, March 2009, Pages 384-392, available at http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V22-4TRR8R1-2&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=6f1f4aadb1ce92e064d910e2a661c12, accessed 25 April 2008.

Yellow (undated) Business telephone listings. Sensis.

<http://www.yellowpages.com.au/search/postSearchEntry.do?clueType=0&clue=firewood&locationClue=brisbane&x=0&y=0> Accessed 6 October 2008

TRUTH, LIES AND SOMETHING IN BETWEEN: KALEIDOSCOPIIC THOUGHTS ON THE ROLE OF BEYOND TIMBER PRODUCTS

Christoph Hartebrodt¹

Abstract--For centuries forest activities have focussed mainly on timber-production, predominantly for owners but for society as well. Although macro-economic importance decreased dramatically after 1900 and particularly after World War II, forestry was a profitable business up until the mid-sixties. After this time, cost-prize squeeze caused a severe economic crisis and led to decreasing profitability. Catastrophic events showed the vulnerability of this single product policy. Within these framework conditions an intense discussion about the value of beyond timber products began.

We argue that the discussion about beyond timber products is partially misleading because of a lack of clear definitions. We underline that both products and outcomes of forest activities play a role and that excludability must be taken into account. We define four types of non-timber effects.

Considering this framework, the paper firstly highlights the financial relevance of beyond timber products. An analysis of the sensitivity of profitability to non-timber revenues and a prognosis about the potential impact of these new forest products is provided. These are based on the Bayesian Belief Network approach, informed by accountancy network data. At first glance it can be stated that the significance of beyond timber products has remained low until the present and moreover, is expected to remain low during the next decades. However we provide evidence that the beyond timber sphere is highly relevant for the public.

Secondly, the paper raises the question, as to whether the perception that small-scale management is mainly dedicated to timber production is correct. The paper shows that it is not only small scale forestry which is embedded in enterprises, but various kinds of other economic activities as well. Therefore the potential role of beyond timber products has to be discussed from different points of view within different size classes and ownership types and more importantly, separately from the point of view of owners and users of these forest products and outcomes.

Finally, we argue that new beyond timber products can be an important supplement for some forest enterprises. Despite this fact, neither from a micro - nor a macro-economic perspective, can a complete shift to non-timber products be expected or recommended.

¹ Forest Research Institute Baden-Württemberg (Germany), Wonnhalde 4, 79100 Freiburg, Tel. +49 761 4018 262; E-Mail: christoph.hartebrodt@forst.bwl.de

INTRODUCTION

The role of beyond timber products is a widely discussed subject, but it is a more or less new discussion. For centuries forests have been a place where timber production was paramount and its utilization for other non-timber goods like (e.g. berries or pasture) only a secondary activity. This importance was not only relevant in the micro-economic sphere but on the macro-economic level as well. A considerable proportion of commercial activities was directly or indirectly related to timber including at the state level, where German states gained a significant part of their budget income from state forests (up to 20%). But with the increasing role of alternative energy sources and other raw materials, along with the ‘industrial revolution’, the macro-economic importance of the narrower forest sector in Europe was over before World War II. Up until the mid-sixties, forestry remained a profitable undertaking for forest owners. After this time however, the effects of a cost-prize squeeze became more and more visible, with a notable decrease in net incomes. After the first nation-wide storm event in 1990 the economic situation became even worse and led to an increasing discussion of the role of non-timber products by forest owners.

From a societal point of view, the role of forests changed as well. The public welfare state after World War II allowed for more and more leisure-time activities, with a considerable portion of them being outdoor-activities. An increasing interest in nature conservation led to public discussions on types of forest management as well.

Today, we have on one hand a considerable group of people who argue that the future value of forests must be found outside of their role as a place where timber is produced. This group highlights the ecological and social functions of forests. Koechli (2006) for example states that the public is mainly interested in this direction. Consequently, a lot of attempts have been made by forest owners to gain benefits from these kinds of activities with a couple of proposals and attempts made and discussed in the forest press over the last decade (Holthausen and Roschewitz, 2007; AID, 2006). A common slogan was “Put Value to the Forests”. However, the intensity of the discussion seems to be negatively correlated with the absolute level of timber prices. This leads to discussion of the role of the traditional timber products.

On the other hand we can state firstly that in different regions all over the world timber production is still prevalent. And what is more, the role of forests seems to have changed over the last couple of years. A more intensive use of renewable energy and materials is seen as one relevant support-factor that can contribute to the mitigation of climate change. This implies a heavier use of timber could be a logical outcome and the ‘crisis’ of the primary sector might be seen as a temporary episode between World War II and the upcoming end of the oil-based economy in the first decades of the present century.

These extremes don’t fit together. Evidence is given that there must be a coexistence of timber and beyond timber products and outcomes (see below). The present paper intends to contribute to the discussion of where, from whom and to what extent, beyond timber products and outcomes can be seen as a relevant chance for forest enterprises and users. Implicitly raised is the question of which factors can explain the presence or absence of these new products. We highlight below, that the relevance must be seen within existing forestry framework-conditions, and that the marketability of these new products can’t be defined uniformly. We use the forest sector in Baden-Württemberg and its different players as a case-study to assess the strength, weakness,

opportunities and threats of beyond timber products in a densely populated, highly industrialized country. The aim of this paper is not to give a complete explanation of the role of the non-timber sphere, but to highlight several important influencing factors and their outcomes in a kaleidoscopic overview.

The remainder of the paper is structured as follows: In the next section the case-study area is introduced. In section three we discuss the definition of beyond timber products as a precondition for an assessment of the relevance of the non-timber sphere under different framework conditions. Section four contains some relevant time series data and recent research findings that show the ambiguity of this issue in Baden-Württemberg. We discuss the results in section five. Concluding comments and references follow.

FRAMEWORK-CONDITIONS OF FORESTRY IN BADEN-WÜRTTEMBERG

Baden-Württemberg is located in the south-west of Germany, close to the French and Swiss borders. 39% of the land surface is forested, a large proportion in Germany. About 25% of the forests are owned by the state of Baden-Württemberg and some 40% by municipalities. The rest is privately owned. Population density is high with about 300 inhabitants per km². This causes, inter alia, an intensive use of forest for recreational purposes, but with tremendous variations between rural and urban areas. As a consequence of the Federal Forest Act, the public has extensive rights of access and use in all forest areas in Baden-Württemberg. The productivity of forests is - with about 12 m³/ha/a - comparably high (in the European context). This, in combination with the aim to establish high volume stands, results in a high average stand volume of ca. 367 m³/ha. The intensity of their use for timber production varies. State and communal forests, along with the larger private forests (>200 ha), use the most part of the annual increment. In contrast, the limited use by small and middle sized enterprises has led to increasing standing volumes during the last couple of decades. The present stand volume has meanwhile been estimated as being critically at risk from storms. Severe storms hit Baden-Württemberg twice during the last 20 years. Storm events are the key factors that influence the profitability of forest enterprises. In times when no relevant amounts of timber have been felled by storms, most parts of the enterprises are profitable. After severe storm events a significant portion of enterprises faced negative operating results for a period of three to four years (Hartebrodt, 2003; 2008).

FOREST PRODUCTS AND FOREST OUTCOMES

Many discussions about ‘Beyond Timber Products’ (BTP) are confusing in some way, because of a frequent, slight misunderstanding of ‘product’ in BTP and other ‘benefiting effects’ of forestry. Subsequently we advocate a strong differentiation between BTPs and forest outcomes as described below. So how can a separation be made?

According to Adam Smith (1784) products are defined as ‘things produced by labour or effort’. With regard to forests it is fact that a lot of benefits from forest are not, or are only weakly, related to forest management activities (Blum et al, 1996, Brandl et al.; 1996), at least under the precondition that forests form the natural cover of a landscape and the mere maintenance of

forest does not need a special effort. Examples are the soil-protection, air-cleaning and landscape functions of forests.

However, they are not all an effect of the pure presence of forests. A relevant number of benefits are strongly related to man-made forest activities and can therefore be seen as products. The term product is used subsequently as a result of these activities. Undisputedly the production of timber belongs to this second group. But it's not only timber production that complies with the BTP definition. A cemetery-forest is man made as is the recreation that takes place on forest-road infrastructure, which is, in the majority of cases, a precondition for forestry under the case study conditions.

Is the differentiation of man-made or not, sufficient to answer the question of whether we have a BTP or not? A criterion that is normally used to define products is marketability / excludability. Therefore we have to discuss the excludability of the use of various forest benefits to decide whether we have a Forest outcome or a BTP. Here legal conditions play a prominent role. Picking of mushrooms is a suitable example to explain the impact of the forest law. In Baden-Württemberg picking of mushrooms is allowed to a large extent. In combination with the public right to access all forest areas, no matter whether they are public or private, it is hence impossible for forest enterprises to draw economic benefits from this highly attractive forest outcome. The lack of excludability defines, or implicitly results in, a forest outcome from the forest owner perspective, regardless if it is the result of management activity or not. Table 1 proposes a suitable differentiation combining the criteria of activity and excludability. The four types of ensuing products and outcomes form the basic construct for the findings and discussions below.

Table 1: Differentiation of Beyond Timber Products and Outcomes

	Excludability of public use	
Result of forest management activities	no	yes
no	Typical Beyond Timber Outcome BTO	Marketable Forest Outcome MFO
	e.g.: Good drinking water Soil protection Air quality improvement	e.g.: Lease of forest for radio stations, grid production Fees for commercial non-forest plant harvest (e.g. allium ursinum)
yes	Non Marketable BTP = societal / legal Beyond Timber Outcome = SLBTO	Beyond Timber Product = BTP
	e.g.: Hiking, biking on forest roading infrastructure Picking of mushrooms	e.g.: cemetery forest compensation fertilisation with positive effects for drinking water

As a result of this, it can be stated that the role of BTPs will be considered differently by users and forest owners as potential providers of BTPs. The more the legal framework conditions prevent excludability, the less attractive they are for forest owners. Or in other words, even if we have a product (defined as a result of forest management activities) the legal and/or societal

framework can modify this product into an outcome from the point of view of the forest owners. A structural conflict can be assumed. Public interest tends to increase the number of BTOs and SLBTOs whereas forest owners are interested in enhancing the importance of MFOs and BTPs.

TRUTH AND LIES – RECENT FINDINGS OF THE ROLE OF BTPS IN BADEN-WÜRTTEMBERG

Timber and non-timber revenues

Despite all attempts during the past decades it must be stated that BTPs never gained economic importance in Baden-Württemberg. The average share of revenues from timber is about 90 percent and does not fall below a limit of 80 percent. Forest enterprises mainly depend on income from timber. The time series does not show a significant trend towards a decrease in the income from timber products. A comparison between different ownership types does not show relevant distinctions (Figure 1). The decrease in the share of timber revenues after 1999 and 2000 is only a result of a sharp timber price crash after some severe storm events.

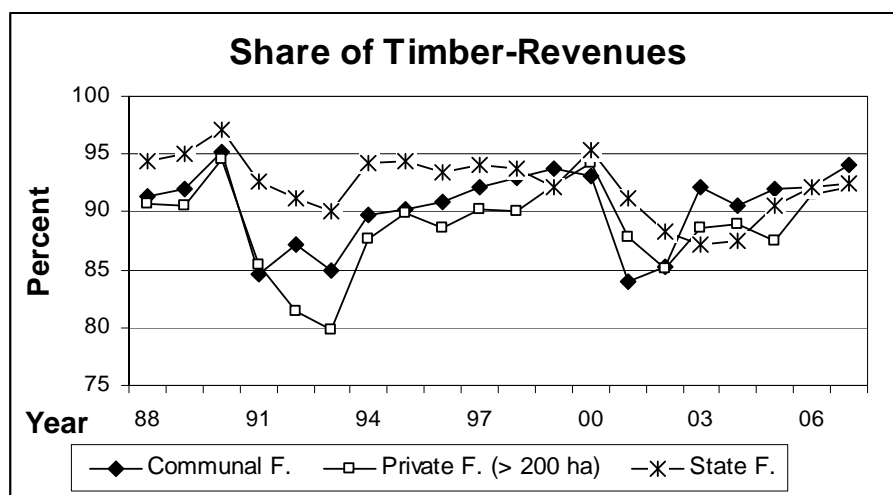


Figure 1: Time series data on the share of timber and non timber revenues

Figure 2 shows the significance of non timber revenues in individual enterprises. The figures provide evidence that only a few enterprises gain significant income from BTOs and MFOs.

Bayesian Belief Network based impact analysis

Bayesian Belief Networks are an appropriate method to analyse the relevance of individual impact factors in complex causative structures. They are suited to analysing economic data as well. For more information concerning methodology and results see Hartebrodt and Braasch (2009). We used an excerpt of a more complex economic network explaining the net income of forests. Figure 3 depicts the network structure, table 2 shows the variance of belief which can be taken as a measure for the strength of the impact.

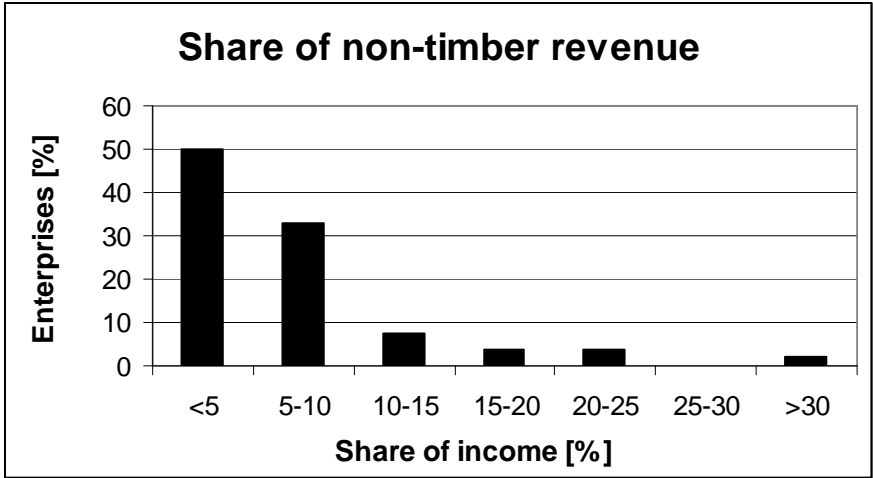


Figure 2: Relevance of non-timber revenues in individual enterprises

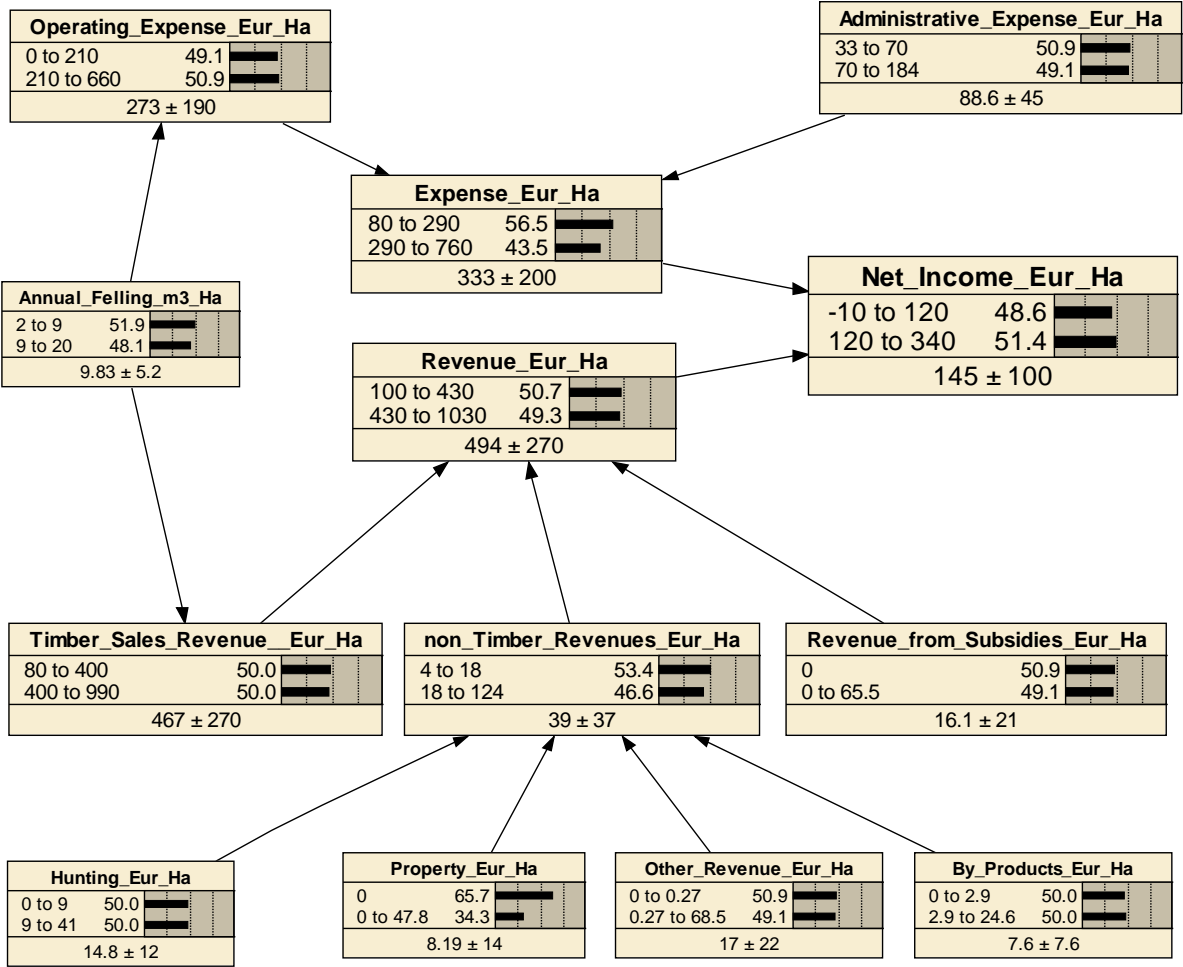


Figure 3: Bayesian belief network for the analysis of explanatory factors for economic success

Table 2: Relevance of individual factors explaining economic success of forest enterprises

Variable	Related Area	Variance Reduction / Sensitivity
Total Revenue	Timber (MFO, BTP)	0.0822987
Timber Sales Revenue	Timber	0.0451786
Annual Felling		0.0233015
Total Expense	Timber (BTP; SLBTO)	0.0020291
Administrative Expense		0.0011485
Revenue from Subsidies	SLBTO, BTO	0.0007993
Operating Expense	Timber SLBTO	0.0007553
Non Timber Revenues	MFO, BTP	0.0000030
Hunting Revenues	MFO	0.0000003
By Products Revenues	BTP	0.0000001
Property Revenues (e.g. Lease)	MFO (BTP)	0.0000001
Other Revenue	MFO, BTP	0.0000000

It becomes obvious that non timber revenues and its contributing variables have almost no explanatory function for economic success. Even when we consider subsidies, which can be taken partially as a compensation for restrictions due to BTO and compensation for SLBTO, there is only a weak influence, but not as insignificant as MFO or BTP.

Expenses for timber-production and production of non-timber products

The nation wide book keeping convention in Germany basically provides the opportunity to get an insight into the share of expenses for different product ranges. Product ranges are for example protection functions and recreation and/or environmental education. This system can be called intentionally book-keeping in that it is intended to give an overview of which main goals the individual effort is dedicated towards. Here it can be shown that the expenses show a great differentiation between individual ownership-types (Table 3).

Table 3: Range of outlays for non timber product ranges in different ownership-types

Year	04	05	06	07	08
Expenses by product ranges			[€/ha/a]		
Communal Forests: Protection function	12	17	16	15	16
Communal Forests: Recreation, Environ. Education	20	25	27	29	24
Private Forests > 200 ha : Protection function	2	1	4	2	1
Private Forests > 200 ha: Recreation, Environ. Education	2	2	1	2	1
State Forest: Protection function	25	20	17	19	16
State Forest: Recreation, Environ. Education	76	62	72	38	36

In general it can be stated that expenses for non-timber production are of higher relevance in public forests (state owned and communal-forests). The expenses in the larger private forest enterprises are more or less irrelevant. With regard to the share of such kinds of expenses in relation to the total expenses, we can state, generally speaking, that it is below 1 % in private enterprises and between 5 and 10% in public forest enterprises.

Importance of the income function of forests

In the context of a survey concerning the risk perception of forest owners, the present appraisal of the importance of the income function of forests has been assessed. Evidence was given that the income function is still relevant for most of the forest owners. The results underline the findings above insofar as the economic function is of medium importance to communal forest owners. But despite the fact that the contribution of the forest to the communal budget is – in most cases – far below 5 percent, a relevant proportion (55%) of the interviewees (mostly representatives of the communities and/or managers of communal forests) stated that the economic function is at least relatively important. The share increases for the group of smaller private estate owners. Despite the fact that their average forest estate is, at far below 5 ha, too small to play an important or at least relevant role in the total household income, roughly 80% of smallholders see them as having some importance to their income function. For the group of larger private estate owners, forest function dominates all other aspects of forest management (> 90%; Figure 4).

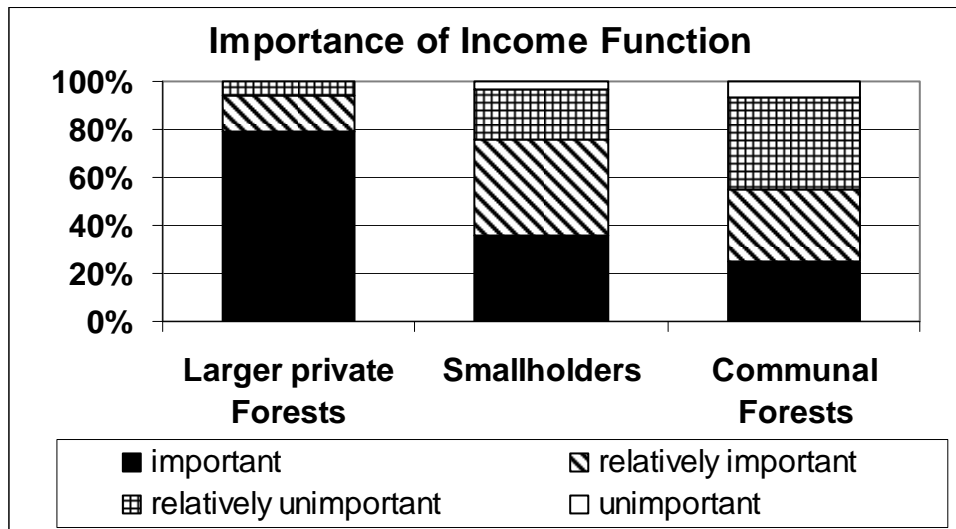


Figure 4: Importance of the income function for different ownership types

Use of BTP and its related restrictions for forest management

An area of further interest is the extent of forest use for non-timber functions and whether forest owners perceive restrictions resulting from these uses. We present below the appraisal by forest owners concerning the use of their forests for recreational and protective purposes and their evaluation of related restrictions.

Recreational use

The results suggest that in all ownership-types there is a more or less heavy use of forests for recreational purposes. As statements had to be supported or rejected on the basis of a four-point Likert scale, values of 2.4, 3.4 and 2.9 can be seen as a strong tendency in that direction (Table 4).

Table 4: Intensity of forest use for recreational purposes

Use for recreational purposes	Proportion of answers in each ownership class (%)			
	Private < 200 ha	Communal	Private > 200 ha	Average
High (4)	16	45	25	29
Medium (3)	28	46	44	39
Low (2)	35	9	28	24
Insignificant (1)	20	0	0	7
Mean score ^a	2.4	3.4	2.9	2.9

a: A four-point Likert scale is used; scores in brackets were weighted by their frequencies to calculate the mean score.

Use for protective purposes

Contrary to the use for recreational purposes, the role of the protective function seems to be less important in the eyes of the forest owners resulting in means between 1.2 and 1.7 (Table 5).

Table 5: Intensity of use of the protection function

Use for protective purposes	Proportion of answers in each ownership class (%)			
	Private < 200 ha	Communal <	Private > 200 ha	Average
High (4)	2	2	3	2
Medium (3)	2	15	6	8
Low (2)	7	36	28	24
Insignificant (1)	90	47	63	66
Mean score ^a	1.2	1.7	1.5	1.5

a: A four-point Likert scale is used; scores in brackets were weighted by their frequencies to calculate the mean score.

Restrictions due to recreational use

The owners perceive restrictions due to recreational use, but only on a medium level. It becomes obvious that these restrictions play a special role in communal forests. The larger private owners take an intermediate position with restrictions due to recreational use of low relevance (Table 6).

Table 6: Restrictions on forest management perceived due to recreational use

Restrictions perceived due to recreational use	Proportion of answers in each ownership class (%)			
	Private < 200 ha	Communal	Private > 200 ha	Average
High (4)	3	14	3	7
Medium (3)	15	30	30	25
Low (2)	41	46	58	48
Insignificant (1)	41	10	6	19
Mean score ^a	1.8	2.5	2.2	2.2

a: A four-point Likert scale is used; scores in brackets were weighted by their frequencies to calculate the mean score.

The ranking concerning the respective uses underlines that the restrictions are significantly less important than the intensity of the use. This can be interpreted as an indication that owners perceive only moderate problems associated with these forest outcomes.

Restrictions due to protective purposes

Here we find again a low, partially insignificant role of restrictions due to protective purposes (Table 7).

Table 7: Restrictions perceived due to the protection function

Restrictions due to the protection function	Proportion of answers in each ownership class (%)			
	Private < 200 ha	Communal	Private > 200 ha	Average
High (4)	2	3	3	3
Medium (3)	2	16	22	13
Low (2)	15	39	19	24
Insignificant (1)	81	42	56	60
Mean score^a	1.2	1.8	1.7	1.6

a: A four-point Likert scale is used; scores in brackets were weighted by their frequencies to calculate the mean score.

Restrictions due to nature conservation purposes

With regard to the restriction resulting from nature conservation purposes, it is mainly the larger private estates who perceive a remarkable but not predominant restriction (Table 8).

Table 8: Restrictions perceived due to nature conservation²

Restrictions perceived due to nature conservation	Proportion of answers in each ownership class (%)			
	Private < 200 ha	Communal	Private > 200 ha	Average
High (4)	1	7	12	7
Medium (3)	5	26	32	21
Low(2)	28	47	47	41
Insignificant (1)	66	20	9	31
Mean score^a	1.4	2.2	2.5	2.0

a: A four-point Likert scale is used; scores in brackets were weighted by their frequencies to calculate the mean score.

Income structure of forest enterprises

The mixed income structure of public forest enterprises, as has already been described for state owned and communal forest enterprises, is evident and does not need to be discussed. The same can be assumed for private forest enterprises between 5 and 200 ha, where forests can contribute to the family income to various extents. An analysis of prevalent income structures for private households, who have at least a basic potential to draw a relevant part of their income from

² Restrictions due to nature protection include restrictions in nature reserves, landscape conservation areas and EU-framework directive flora - fauna - habitats.

forests, allows an insight into the income structure of a considerable portion of forest owners in Baden-Württemberg.

Mijacz (2000) assessed the income structure of these types of enterprises. It was obvious that these enterprises also have a mixed income structure and use - as a whole - multiple pillar strategies. However the results depicted in figure 4 show that there is a very wide range of individual 'entrepreneurial strategies'.

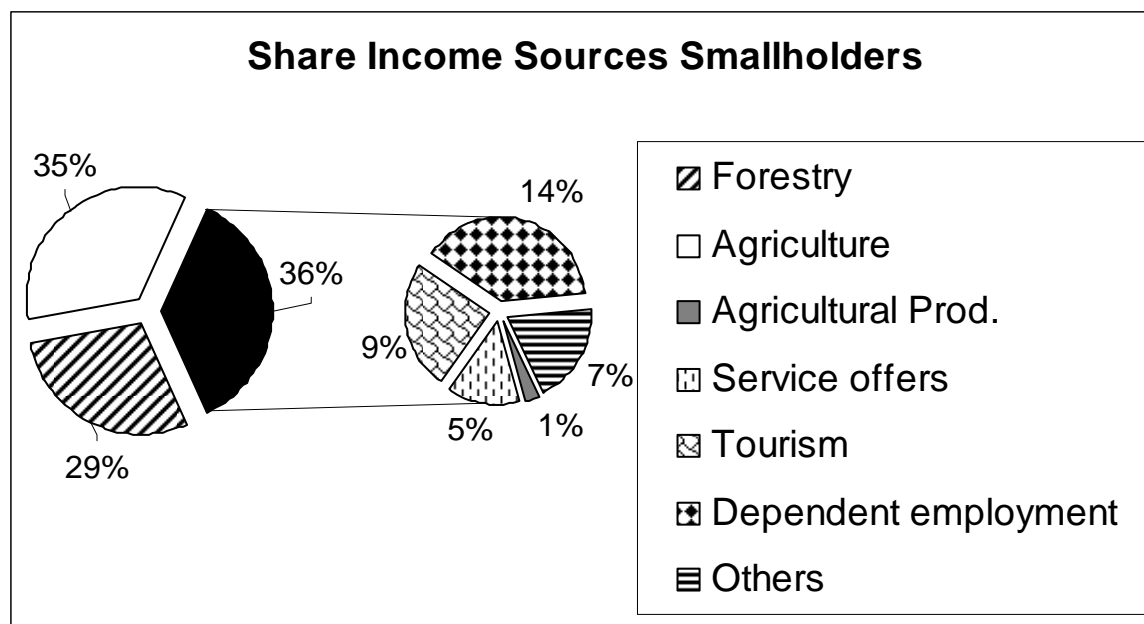


Figure 4: Importance of different income sources for medium sized forest enterprises

Despite the tremendous variability, on average only a third of the total income is from forest activities. Therefore it can be stated that forestry is not a dominant income source even for this group.

SOMETHING IN BETWEEN – EXPLANATORY FACTORS FOR THE RELEVANCE OF DIFFERENT TYPES OF FOREST OUTCOMES AND PRODUCTS UNDER EXISTING FRAMEWORK CONDITIONS

Role of the non-timber sphere for forest owners

How can these findings be interpreted? Despite the fact that we have notable distinctions between individual ownership types, evidence is given that BTP does not and did not play a relevant economic role under forest policy and economy frameworks in Baden-Württemberg. From an income perspective forest enterprises must still be seen as rather single-product-based enterprises. The long term outlook does not indicate that this will change during the next couple of years.

The analysis and simulation with the Bayesian Belief Network approach leads to the same conclusion. From an economical point of view, BTP and MFO are not relevant for the forest sector in Baden-Württemberg as a whole. However, in individual cases the situation can differ. About 6% of enterprises gain more than 20% of their revenue from non timber income. This

leads to the conclusion that it is not impossible - under special regional or structural conditions - to have a relevant income contribution from outside of the timber revenue streams. But it is more a niche-phenomena or individual opportunity than a perspective for the whole forest sector. Holthausen and Roschewitz came to the same conclusion regarding the importance of recreational products in Switzerland (2007). In the present situation the increasing role of the non-timber sphere for forest owners must be characterized as a lie.

Multiple pillar strategies

The poor importance of BTO and MFO is contrasting the situation that we know – with regard to pure forest part of the enterprises – that this will be a risky course of action in times, in which storm events are expected to become more frequently. But this can be easily explained by the structure of forest enterprises in the Baden-Württemberg case study area. The diversification occurs, in most cases, outside of the strictly forest parts of the enterprise. Forests play, in general, a small role in the complex and mixed economic structures of states and municipalities. There is no need to undertake substantive efforts to enhance the profitability or reduce the risk of the forest part of the enterprise (Hartebrodt et al., 2007). Even the smaller forest owners have, in general, a multiple pillar strategy with only a third of family incomes coming from their forests (Mijacz, 2000). The only group who are, according to the findings above, more dependent on their forest income are the larger private estates. This group is well known for its strong economic orientation. Insofar as one can assume that the BTP would play a more relevant role if they were economically viable. This is obviously not the case. Their impetus to enhance the output of BTP for economic reasons is obviously low.

Social Legal BTO as a public task

It is a notable fact that we have only weak differences concerning the income from BTPs and MFOs between the public and private forest sectors. On the contrary, we find notable differences in the expenses for BTP/MFOs between the different ownership types in general, despite the fact of an extreme variability with regard to individual enterprises. Under framework conditions that prevent, to a great extent, new profitable, consumer-oriented BTP/MFOs, it remains a duty of the public (insofar as they are tax financed) forest enterprises to invest in BTPs and MFOs. An increase of BTPs in the private forest sector is unlikely.

Different points of view

However, this does not mean that the beyond timber sphere does not play a role in Baden-Württemberg. The results described above suggest that we have a societal use of forests for ecological purposes, which is not too astonishing in a densely populated area. Insofar as the perception of the forest owners that their forest are heavily used by the public (Table 4 and 5) is credible. But this use is not on the basis of BTP or MFO but in multiple ways as BTO or SLBTO.

From this it follows that there is a basic conflict between society and forest owners, especially private forest owners. Looking at the topical political discussion, we find a request for compensation or direct payment for this societal use of forest, which is basically a transformation of BTO / SLBTOs to MFOs and BTPs. The justification regularly given is the restrictions resulting from such kind of forest use. However the results suggest that this justification is only partially true. Most of the use of BTOs and SLBTOs are clearly not perceived as relevant restrictions for forest management, except for the increasing demand for areas dedicated for nature conservation purposes.

From this it follows that the need to modify the present legal framework towards more restricted public rights is low. In addition to the societal demand and associated expected societal opposition to any changes, a significant shift can't be expected.

CONCLUDING COMMENTS

We agree with the findings of Blum et al. (1996) and Brandl et al. (1996) that we have to distinguish between products and outcomes of forestry. But a differentiation based purely on whether we have a management activity or not, can be improved by using an excludability criterion which can be taken as a synonym for marketability. We argue that this excludability is partially naturally given, but can depend on differing societal and/or legal settings. This differentiation may help explain the supply and demand structures of the non-timber spheres of forest enterprises.

Given the present situation, the statement that there is, in general, an increasing role in the non timber sphere must be a lie. This has arisen due to the different points of view of forest owners and the public. Most forest owners never perceived them as relevant business options. They remain niche opportunities. And they cause, in contrast to frequent demands from forestry associations, only a partial restriction on operations.

The public, on the contrary, perceives a prevalent role for these non timber products and outcomes. Under the framework conditions of an extensive public access and use right, it can be stated that there is a basic satisfaction. The probability of a further rapidly increasing societal demand is unlikely or has only local relevance. But in this case the demand will require public spending due to the limited possibilities to establish BTPs. This will result in public forests with higher expenses and decreasing profitability or subsidies for private forest owners.

This conflict is limited to the increasing role of legal restriction for nature conservation purposes.

Evidence is given that the role of BTPs should not be discussed in isolation, but always from various perspectives and in the context of the present framework conditions. Beyond timber products and outcomes are not important or unimportant in general. They are something in between and this needs further examination.

REFERENCES

- AID (2006): Leitfaden innovative Waldprodukte - Neue Einkommensquellen zur Vermarktung der Schutz- u. Erholungsleistungen von Wäldern. Nr. 1534/2006, 48 p.
- Blum, A.; Brandl, H.; Oesten, G.; Rätz, T.; Schanz, H.; Schmidt, S.; Vogel, G. (1996) Wohlfahrtsökonomische Betrachtungen zu den Wirkungen des Waldes und den Leistungen der Forstwirtschaft. AFJZ 167, 89-95
- Brandl, H.; Hercher, W.; Löbell, E.; Nain, W.; Wagner, K. (1996): Wirkungen des Waldes und Leistungen der Forstwirtschaft. AFZ/Der Wald 51, 22-26
- Hartebrodt, C. (2003): Situation im Bauernwald Baden-Württemberg im FWJ 2003 . Stabile Krise oder in der Krise stabil. AFZ 22/2004, 1193-1195.
- Hartebrodt, C. (2008): Katastrophe als Normalität. Forstzeitung 1/08. 30-31-
- Hartebrodt, C.; Braasch, M.; Aichholz, R. (2009) Analysing and Predicting Accountancy Network Data with Bayesian Belief Networks in Comparison with Traditional Analysing Methods (in process)

- Hartebrodt, C., Holthausen, N.; Bitz, S. (2007): Versicherungslösungen als Bestandteil des Risikomanagements in Forstbetrieben. *Allgemeine Forst- und Jagdzeitung* 178/5,6, 98-108.
- Holthausen, N.; Roschewitz, A. (2007): Wald in Wert setzen für Freizeit und Erholung. *Umwelt-Wissen* 16/07. 39 p.
- Koechli DA (2006) Gewichtung der Ansprüche an den Wald. *Schweizer Zeitschrift für Forstwesen* 157 (2). S. 33-44.
- Mijacz, A. (2000): Sonstige Einkommensmöglichkeiten gemischter land- und forstwirtschaftlicher Betriebe im Südschwarzwald. Diploma theses, University of Freiburg. 117p.
- Smith, A. (1784) *An Inquiry into the Nature And Causes of the Wealth of Nations* 1776; Vol 1-3.

ARE SMALLHOLDERS REALLY INTERESTED IN EXTENSION SERVICES FOR NON-TIMBER PRODUCTS?

Christina Hock¹ and Christoph Hartebrodt

Abstract--The societal demand for non-timber products in South-Western Germany is high. As Germany is densely populated, both recreational and environmental aspects play a relevant role. Nevertheless, it is common knowledge that non-timber products have to be split into outcomes from forests, related to the mere existence of forests and effects from man-made forest management activities. Therefore, one has to be aware that only some of these benefits for society are a result of active forest management. Until now most attempts to develop marketable non-timber products in Germany have failed, at least partially. 90 to 95% of revenues from forest holdings are from timber products. Recent studies indicate that forest owners are aware of the heavy use of their forest, but don't perceive too many restrictions arising from this societal use. Corresponding with this, forests are - in the eyes of smallholders - still mainly dedicated to timber production. Under this framework an explorative case study was carried out in which we assessed the interest of smallholders in extension services for traditional and new non-timber products. A number of new service offers were developed and intensively marketed. We compare the demand for new services with that for traditional consulting e.g. timber marketing advice, assistance with timber grading and silvicultural treatments. We argue that the interest of smallholders is still focused on traditional consulting offers and that only a small number of forest owners are interested in new extension services. A first appraisal of the interdependencies between different types of forest owners and demand for extension services is given.

INTRODUCTION

Baden-Württemberg is a state in the South-West of Germany, bordering France and Switzerland. Forests cover 39% of the land surface and play a dominant role in the landscape. Twenty-five percent of the forests are owned by the state, roughly 40% by communities and 40 % are privately owned. Two thirds of the private forest estates have a forest area below 200 ha. Smallholders own a total of 187,000 ha with less than 5 ha each.

The state forest administration is an integrative forest organisation, responsible for all ownership types. The administration offers a wide range of extension services. The general evaluation of the value and quality of these services is high. The consequently high input required from the forest administration is justified in many cases by the high importance of the forests for ecological and social purposes, and by the associated high demand for advice and assistance in these areas.

¹ Forstliche Versuchs- und Forschungsanstalt Baden-Württemberg, Germany, D-79117 Freiburg, Wonnhaldestraße 4; Tel, +49 761 4018 312, Email: christina.hock@forst.bwl.de

However it is evident that there is a need to differentiate between forest products (be it timber or non-timber) and forest outcomes, which do not require particular management activities (Blum *et al.* 1996, Brandl *et al.* 1996). Hartebrodt (2009) revealed that from the point of view of the forest owners, the non-timber sphere is almost insignificant.

In response to the fragmentation of forest holdings, some of the service offers are free of charge, whereas other services are moderately priced. There is an intensifying discussion whether these extension services should be subsidised, and if so, by how much. The political consensus is that the personal responsibility of the owners should be increased. Forest associations are recognized as one means to achieve that goal. One impediment to the incremental enhancement of these privately or commercially offered consulting services is the lack of knowledge about forest owner's demand for and willingness to pay for these different types of consulting offers. This is, at least partially, a result of the present paramount role of the Baden-Württembergian forest administration in forest extension services. This is because the resulting benefits were politically accepted as public benefits and hence an unavoidable public task. In Germany and in many other European countries there is – to our knowledge – no accounting system that provides detailed information on cost and demand of the individual services. In most cases, cost efficiency is calculated only at the state level, comparing the total cost of consulting services to the total amount of fees invoiced.

We have therefore a basic interest in knowing which service offers are of most interest to smallholders, especially considering the wide variation in attitudes towards forestry (Selter *et al.* 2009, Borgstädt, 2004). In particular, we wanted to know whether the services of interest were related to social and ecological forest functions, or to traditional issues like timber felling and harvesting. In this paper, we intend to give a first overview of the appraisal and demand for different types of forest extension services. The distribution of demand for traditional timber-oriented and new non-timber-oriented offers can be taken as an indicator for the relevance of the non-timber sphere.

MATERIALS AND METHODS

The results are considered in the context of a larger project, in which we analyse the demand for and perception of different extension offers by smaller forest enterprises and assess the costs and time requirements of individual services. The core of the study is two case studies, in which individual consulting offers were provided by members of the project team during a three-year field experiment.

In order to get an overview into which kind of offers were of most interest to forest owners, an *ante* survey was carried out in which the use and perception of individual offers was evaluated. We classified 30 individual service-offers into four groups (Table 1). Most of them are related to traditional forest activities, but a few are related to the non-timber sphere (see column 'Others').

We conducted a survey, based on a questionnaire distributed by mail. In addition to demographical aspects and questions concerning the persons or institutions who should offer such services we also asked whether the interviewees made use of individual offers in the past and whether they considered these services as important or not. Here we used a four-point Likert scale.

Table 1: Service offers in different product ranges


(Service offers) Product Ranges			
Timber Harvest	Timber Sales	Silviculture	Others
Showcase timber marking	Search for timber buyers by forest experts	Advice on pest control	Advice on nature protection issues
Advice in timber grading and scaling	Timber-selling by forest experts	Advice in different methods of forest regeneration	Advice in construction of forest road infrastructure
Engaging logging contractors	Marking of stacks	Advice for planting activities	Valuation of forests
Billing of contractors by forest experts	Mapping of stacks by forest experts	Advice on precommercial thinnings	Marking of land boundary
Job safety advice	Invoicing of timber sales by forest experts	Forest management plans	Advice on subsidy schemes
Advice in construction of skidding roads and timber storage facilities	Instruction of logging contractors	Various technical training offers (e.g. use of chain saw)	Advice on Forest Certifications (FSC, PEFC)
Timber grading and scaling by forest experts	Organisation of timber sales by submissions	Organisation of meetings of forest owners	Marketing of bio-energy
Sales lists by forest experts			Consulting on (marketable) forestal education services

Basic information about the population of the two case study areas, Baden-Württemberg (lower part of the map, Southern Germany) and Mecklenburg-Vorpommern (upper part, Northern Germany) is summarized in Table 2.

As the results indicated that forest owners have a focus on traditional service offers (see below), we decided to test if the interest in new products could be enhanced by developing new consultancy services in combination with an intensive marketing campaign involving direct mailing and oral presentation² during forest association meetings.

² We developed a product flyer which was sent to about 1280 households in the case-study regions and distributed and explained during meetings.

Table 2: Basic data about case study regions and survey

Case study region	Baden- Württemberg	Mecklenburg- Vorpommern	Map case study regions
Area of private forests	1330 ha	6300 ha	
No. of owners	1765	3791	
Average property size	0.75 ha	1.7 ha	
No. of parcels	7082	N.N.	
Questionnaires sent	1321	1029	
Questionnaires completed	330	83	
Response rate	25.0	8.1	
Survey period	2nd quarter 2007		

We offered the following products listed in list 1:

List 1: New consulting offers

- Simplified forest management plans
- Economic valuation of management restrictions
- Evaluation of ecological values of the forests
- Description of legal restrictions for forest management
- Advice on swap of forest plots
- Advice on selling forest property
- Forest excursion together with the owners in their own estate

RESULTS

Interest in existing service offers

The results are presented in Tables 3 to 6. Each Table provides information about similarities and or distinctions between the case study regions. We highlight the share of respondents who already used individual service offered ('% Used') and their appraisal of the importance of the individual offer. Here we used a four-point Likert scale³. Means above 2.5 indicate a generally positive perception. Means exceeding 2.75⁴ were taken as an indicator of a clearly positive evaluation, while 2.25⁵ or less indicated a clear lack of importance.

³ Coding: Very important = 4; important = 3; less important = 2; absolutely unimportant = 1.

⁴ This is for example a distribution of 75% important and 25% less important.

⁵ This is, on the contrary 75% less important, 25% important; statistical significance depends largely on the number of respondents.

In both regions, extension services related to timber harvesting activities were the most intensively used with an average of 21% (Baden-Württemberg) and 16% (Mecklenburg-Vorpommern). The results presented in Table 3 (and in the following Tables as well) show that the intensity of use is higher and appraisals more positive in Baden-Württemberg than in Mecklenburg-Vorpommern.

Table 3: Use and perception of services related to timber harvest

Product range and Service offers	Baden-Württemberg		Mecklenburg-Vorpommern	
	% Used	Importance	% Used	Importance
Timber Harvest				
Showcase timber marking	34	2.76	25	2.51
Advice in timber grading and scaling	28	2.63	15	2.40
Engagement of logging contractors	6	1.87	15	2.23
Billing of contractors by forest experts	14	2.12	18	2.17
Job safety advice	24	2.62	13	2.19
Advice in construction of skidding roads and timber storage facilities	12	1.97	15	2.06
Timber grading and scaling by forest experts	28	2.65	20	2.21
Sales lists by forest experts	23	2.49	13	2.01
Average	21	2.39	16	2.22

Showcase timber marking can be seen as a very important offer, both in terms of the share of users and the appraisal of the importance. Advice in timber grading and scaling and timber scaling executed by forest experts rank high as well. A relevant distinction between the situations in the two regions is the role of the service offer ‘engagement of logging contractors’. In Baden-Württemberg there is a very limited use and low importance ranking for this service, whereas the smallholders in Mecklenburg-Vorpommern made heavier use and evaluated this product more positively (Table 3). Work safety advices – on the contrary – are more relevant in Baden-Württemberg.

In the product range ‘timber sales’ we can identify three service offers being of particular relevance. These are search for timber buyers, the complete overtaking of the whole marketing activities by forest experts, and the marking of stacks. We find again, in general, an overlap between the use and the evaluation of the importance of the individual service offer (Table 4). With regard to the service ‘invoicing of timber sales by forest experts’ and ‘marking of stacks’ the results suggest a higher importance in Baden-Württemberg. The average share of owners, who availed themselves of these offers, differs notably between Baden-Württemberg and Mecklenburg Vorpommern.

Table 4: Use and perception of services related to timber sales

Product range and Service offers	Baden-Württemberg		Mecklenburg-Vorpommern	
	% Used	Importance	% Used	Importance
Timber sales				
Search for timber buyers by forest experts	29	2.69	15	2.44
Timber selling by forest experts	24	2.56	15	2.29
Marking of stacks	24	2.40	15	2.00
Mapping of stacks by forest experts	8	2.02	5	1.80
Invoicing of timber sales by forest experts	19	2.30	13	1.85
Instruction of logging contractors	18	2.15	10	1.95
Organisation of submissions	5	2.05	3	1.95
Marketing of bioenergy	14	1.97	0	1.84
Average	17	2.27	9	2.01

In the product range ‘silviculture’, advice concerning ‘pest control’, ‘forest regeneration’, ‘planting activities’, ‘precommercial thinning’ and various kinds of ‘technical training’ ranked highest and are therefore clearly accepted as relevant extension offers for smallholders (Table 5). However results show that the present use of these services does not completely correspond with the perception of their importance. The average share of owners who already utilized these offers is lower in Baden-Württemberg than for the product ranges ‘timber harvest’ and ‘timber sales’. In Mecklenburg-Vorpommern the percentage of the owners how made already use of consulting offers concerning silvicultural treatment is higher than in the product range timber sales but lower in the product range timber harvest.

Table 5: Use and perception of services related to silviculture

Product range and Service offers	Baden-Württemberg		Mecklenburg-Vorpommern	
	% Used	Importance	% Used	Importance
Silviculture				
Advice in pest control	24	3.14	13	2.61
Advice in different methods of forest regeneration	20	2.86	10	2.49
Advice for planting activities	25	2.83	13	2.44

Advice in precommercial thinnings	14	2.87	20	2.46
Forest management plans	2	1.88	5	1.89
Various technical training offers (e.g. use of chain saw)	32	2.95	15	2.22
Organisation of meetings of forest owners	23	2.32	15	2.20
Marking of land boundary	12	2.59	13	2.15
Advice in construction and maintenance of forest road infrastructure	4	1.96	10	1.95
Average	17	2.60	13	2.27

Of special interest to the landowners were the offers which do not belong to the product ranges discussed above. As Table 6 indicates, there is a less intensive use of these service offers. However, the perceived importance is high for the offers ‘advice subsidy schemes’ and ‘nature protection issues’.

Table 6: Use and perception of services related to other service offers

Product range and Service offers	Baden-Württemberg		Mecklenburg-Vorpommern	
	% Used	Importance	% Used	Importance
Others				
Valuation of forests	8	2.28	5	2.06
Advice on subsidy schemes	12	2.65	13	2.45
Advice on Forest Certifications (FSC, PEFC)	8	1.84	0	1.51
Consulting on (marketable) forestal education services	9	1.91	0	1.52
Advice on nature protection issues	8	2.50	10	2.23
Average	9	2.24	6	1.95

Interest in new service offers

As the campaign to make new consulting offers is ongoing, the results presented below are preliminary. Thus, at the present time, we have only had a moderate feedback on our service offers. Including the participants of the forest associations meetings at least 1500 people should be addressed. Of these only 24 people contacted us, which is <2 %. Further, three of these people indicated that they no longer owned forests.

It also became apparent that the campaign was in many cases more of a reminder that extension offers were available, and this frequently resulted in a request for only the traditional offers. About 50 % of the requests received focused on 'traditional' consulting offers.

From the new offers (see list 1), only two met a relevant smallholder interest. They were the forest excursion, about 30% (7 cases) of the demand and questions related to selling or buying forest estate (4 cases; about 20 %).

Typological aspects

The results of the survey included information about the smallholders; therefore it was possible to assess the key influences that explain the demand for different service offers. We used the chi-square test to identify the most relevant factors.

The influence of different typological aspects on the demand for different extension offers is introduced in Table 7. The Table presents the share of individual extension offers in the respective product ranges (see Table 1), which have been used or evaluated significantly differently by different subpopulations. We compared, for example, the group of the members of forest association with the non-members. When we look at the individual service offers 7 of 8 offers in the product range timber harvest showed statistically significant different evaluation with regard to the former use. Therefore 88% of the offers in this product range are different (column: Timber harvest % used; row: Membership in forest association).

It is clear that the total forest area, number of parcels, kind of forest use (self-sufficiency, timber selling, etc.), forest association membership (as well as conceivable membership), and whether the forest is part of a mixed agro-forest enterprise has an influence on the appraisal and intensity of use of many service offers. Thus, membership in a forest association leads to a much higher appraisal of the importance of individual service offers across all product ranges (Figures 1 and 2). A comparable result is achieved when we look at the interdependencies between the size of the enterprise and the appraisal of different offers (Figure 2). The results suggest that the same typological aspects which explain the use and appraisal of traditional consulting offers are the explaining factors for the non-timber related offers (Table 7).

DISCUSSION

The results have first to be put into historical context. We argue that we have two distinctions which predominantly influence the results.

First is the experience that smallholders have with forest authorities. In Baden-Württemberg, there has been intensive and trustworthy cooperation between State Forest Administration and smallholders for more than half a century. The quality of the offers is accepted and most smallholders prefer the State Forest Administration as the provider of service offers over offers from private consultants and/or consulting offers made by sawmilling or pulp and paper industry. In Mecklenburg-Vorpommern, there is a basic scepticism towards the administration, which is mainly related to its history as a planned economy. Private rights of forest owners were neglected and forest management was mainly executed by state authorities for almost 50 years. The general difference between the two case study regions in the percentage of owners who made use of the services offered by the State forest administration can easily be explained by this history.

Second, in Mecklenburg-Vorpommern, more attempts have been made to increase the amount of service offers made by other institutions.

Besides this underlying difference in the intensity of use, preferences for individual extension offers are very similar. The ranking of service offers commonly used and even their evaluation of the importance is, in most cases, the same in Baden-Württemberg and Mecklenburg-Vorpommern.

Table 7: Influence of typological aspects on use and perception of different service offers

Baden-Württemberg	Timber Harvest		Timber selling		Silviculture		Others	
Typological / demographic aspect	Imp.	% Used	Imp.	% Used	Imp.	% Used	Imp.	% Used
	[% of individual service offers in the product range, which differ significantly between subpopulations defined by different parameter values of typological aspect]							
Total forest area	88	88	100	86	67	67	70	50
Number of parcels	75	88	86	71	83	67	100	70
Continuity of ownership	0	50	0	14	0	17	0	0
Type of forest use	100	88	86	71	100	100	60	30
Use of forest service providers	100	100	100	100	67	100	60	100
Membership in forest association	100	88	100	100	100	83	100	80
Conceivable membership in forest association	100	75	100	71	100	50	90	40
Location of the forest estate	0	0	0	0	0	0	10	0
Gender of owner	0	63	29	57	0	0	20	20
Age of owner	13	0	0	29	0	17	10	0
Who manages the forest (e.g. self-employment, contractors)	25	13	29	14	33	17	40	30
Combination with agriculture	88	88	86	86	50	67	90	40

Even with regard to the traditional extension offers, the demand focuses on a couple of service offers. In Baden-Württemberg, the offers which are heavily used are showcase-timber marking, advice concerning timber grading and scaling or overtaking this task, advice on pest-control and planting. Timber marketing-offers are prominent as well. The appraisal of the importance of these offers supports, in most cases, the degree of utilization by the forest owners. Although with lower scores (utilization and importance ranking), the results in Mecklenburg-Vorpommern support the findings in Baden-Württemberg. It must be mentioned that self-employment is much higher in Baden-Württemberg than in Mecklenburg-Vorpommern. This may explain why higher importance is placed on security advice and technical training offers in Baden-Württemberg.

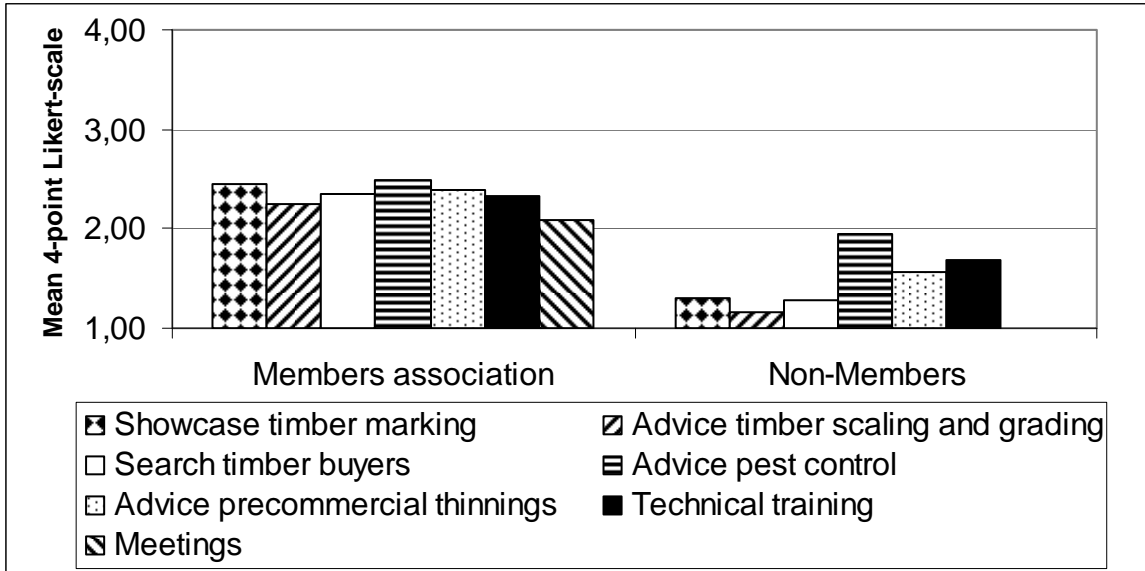


Figure 1: Influence of the membership in associations on various service offers

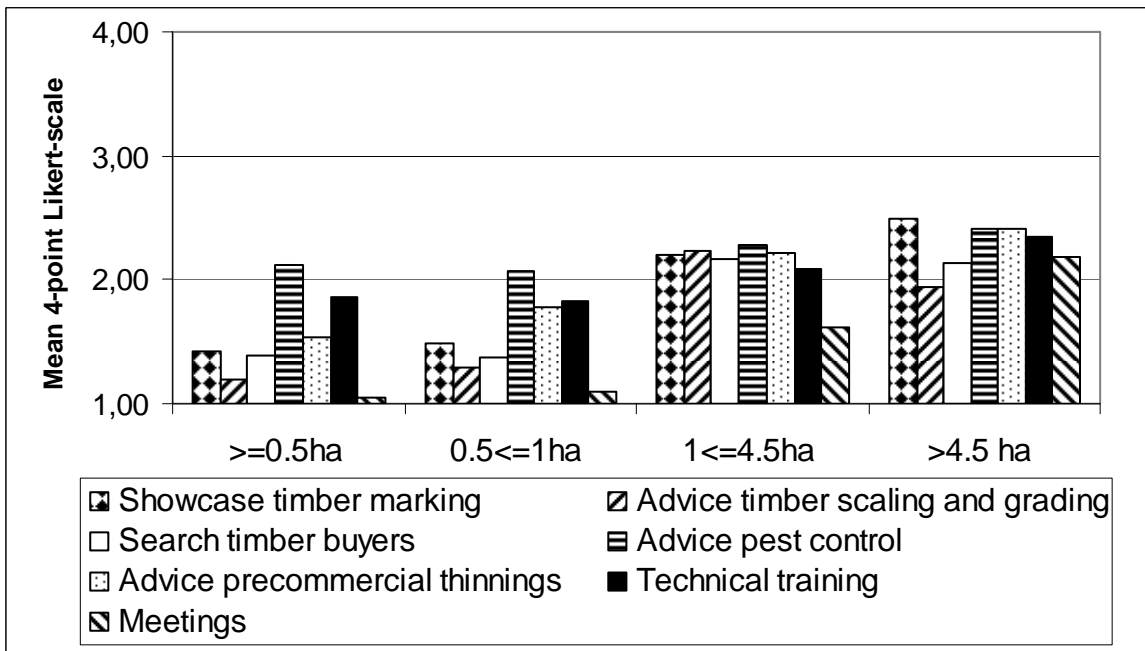


Figure 2: Influence of the forest area on various service offers

We argue that even with regard to the traditional forest extension offers, there is a concentration of owner interest in offers which are related to the very core of forest management: regeneration, timber harvesting and selling.

With regard to the non-timber-extension offers, which were part of the *ex-ante* survey, the results clearly show that these offers are subordinate. In Baden-Württemberg, less than 10 % of the interviewees made use of this type of advice, except for information about subsidy schemes. The values in Mecklenburg-Vorpommern are lower, sometimes zero. The assessment of the

importance of the related service showed a moderate importance (2.24 = close to “less important”) in Baden-Württemberg and was worse (1.95 = “less important”).

It follows then that when extension offers are used, we have a high focus on very traditional forest activities like planting, tending and harvesting. Despite the fact that there is profound knowledge that there are different types of forest owners, some of whom only partly focus on timber harvesting, it is apparent that only owners who are interested in harvesting undertake management activities. Forest owners, who are mainly interested in non-timber values, enjoy the benefits of the outcomes (comp. Hartebrodt, 2009) but can not be really expected to undertake further management steps to develop these non-timber functions of their forests.

Taking into account the fact that the campaign promoting the new service offers is still ongoing, the results are preliminary. However, first indications suggest that the response rate is expected to remain in the lower single-digit range, probably less than 3 %. Only a few owners contacted the project staff. Even the people who got in contact have been predominately interested in either basic information about their estate or in more traditional extension offers. As we noted that the respondents were in most cases people who live away from their estates, the campaign was more suited to informing them of consulting offers in general rather than enhancing the demand for new consulting offers. We conclude that even with extensive campaigning activities, the structure of the demand for different kinds of service offers can't be influenced significantly.

The results concerning the typological aspects suggest that structural changes in the ownership of the forests can modify the general level of interest and perception towards extension services, but not the interest in non-timber consulting offers in particular. This leads to the hypotheses that it is more likely that the traditional service offers promote the use and perception of new products than vice versa.

CONCLUDING COMMENTS

The results of this study indicate that a notable increase in the active demand for extension offers related to non-timber forest products can't be expected. Corresponding with the findings of Hartebrodt (2009), it is more a question of *whether* the forest owner undertakes management activities at all, rather than *what kind* of management activities they will do. Apparently, the non-timber functions of a forest, in the context of extensive public rights of access and use, are seen as outcomes of forests and not as products of active management.

It is still the timber function that leads to contacts between extension staff and forest owners. Notable changes in this situation due to structural changes like increasing urbanisation or an increasing average age of owners can't be expected. Simply the decreasing number of mixed farm-forest enterprises might result in some small changes over time. However, other factors with a strong explanatory power, like total forest area and degree of parcellisation, are simply impossible to change. Therefore the focus on timber-related demand for extension offers will remain.

REFERENCES

Blum, A.; Brandl, H.; Oesten, G.; Rätz, T.; Schanz, H.; Schmidt, S.; Vogel, G. (1996): Wohlfahrtsökonomische Betrachtungen zu den Wirkungen des Waldes und den Leistungen der Forstwirtschaft. AFJZ 167, 89-95

- Borgstädt, K. (2004): 'Motivationale Faktoren bei Kleinprivatwaldbesitzern – Leitfaden zur Typisierung der Teilnehmer des Testbetriebsnetze Kleinprivatwald (5-200 ha) hinsichtlich ihrer Einstellung zum Waldbesitz und zur Waldnutzung'. Diplomarbeit an der Fakultät für Forst- und Umweltwissenschaften der Albert-Ludwigs Universität Freiburg, Eigenverlag, Freiburg
- Brandl, H.; Hercher, W.; Löbell, E.; Nain, W.; Wagner, K. (1996): Wirkungen des Waldes und Leistungen der Forstwirtschaft. AFZ/Der Wald 51, 22-26
- Hartebrodt, C. (2009): Truth, Lies and Something in between - Kaleidoscopic thoughts on the role of beyond timber products. (same publication)
- Selter, A.; Hartebrodt, C.; Brandl H.; Herbohn, J. (2009): A Critical Comparison of Typologies of Small-Scale Forestry in Baden-Württemberg, Derived Using Single and Multiple Criteria. Small Scale Forestry 8(1); 25-42.

DEVELOPMENT PHASES OF FOREST PLANNING ACTIVITY IN PRIVATELY OWNED LAND: A PLANNING WORK PERSPECTIVE

Raili Hokajärvi¹, Jukka Tikkanen¹ and Teppo Hujala²

Abstract--In Finland as in some other Northern countries the forest planning belongs to the category of 'sermon policy tools', the underlying assumption being that the aims of society and forest owners congrue: when the owners make planning-supported decisions, the national economy also benefits. In the national scale this assumption has been true for decades, when owners while aiming mainly timber trading incomes have guaranteed a smooth roundwood flow to forest product industries. The present paper draws a picture about the development phases of Finnish forest planning activity from 1960s, focusing particularly on the rhetoric about the role of forest owners in the planning discourse. The paper is motivated by societal value diversification and demands for more pluralistic planning systems. The "historical types" of the work – craft, mass production, process enhancement, mass customization and co-configuration – can be recognized in the development phases of the Finnish planning discourse. These phases are illustrated by examples from planning practices. Symptoms of mass customization, seen as dominating the present developmental discussion of forest planning, are described more precisely. Finally some weak signals calling for the next activity principle, co-configuration (in other words "collaborative development"), are presented and some possible features of this forthcoming type of planning, labeled in the paper as an adaptive planning, are discussed.

INTRODUCTION

In countries where there are plenty of non-industrial private forests, Finland being one example, state-supported forest management planning has been considered an effective tool to make family forest owners manage their forests according to national economic aims (Hyttinen 2001, Ollonqvist 2001). In some countries, e.g. in Romania and France, the plans for family forests have an obligatory status (Bouriaud 2001). Most often however, like in Finland, planning belongs to the category of *sermon policy tools* (Bemelmans-Videc *et al.* 1998) or *capacity tools* (Schneider and Ingram 1990), the underlying assumption being that the aims of society and the individual forest owners are coherent enough: when the owners make rational decisions, supported by planning, also national economy benefits.

To enhance holding-specific planning and effective extension the Finnish state has founded a nation-wide organization (Forestry Centers) and procedure to conduct Regional Forest Inventories (RFIs) for private forests. The RFI is a key instrument for guiding forest owners towards the implementation of the national forest policies and therefore it is funded from the

¹ Oulu University of Applied Sciences, School of Renewable Natural Resources, Metsäkouluntie 4-6, FI-90650 Oulu, Finland

² University of Helsinki, Department of Forest Resource Management, Helsinki, Finland

state budget. The basic data are collected in the so-called planning regions covering 2000–5000 ha each. Normally, the forests in a planning region are owned by tens or even hundreds of forest owners. The forest data are collected covering the whole area, not only the forests of owners who have ordered a holding-specific forest management plan (FMP).

The Finnish forest legislation does not oblige the forest owners to have holding-specific FMPs, although their importance is emphasized in various laws and regulatory guidelines for Finnish forestry. The Ministry of Agriculture and Forestry has given a directive on the contents of the FMPs in order to standardize them. A FMP has to contain information on the amount of planned cuttings, incomes and costs during the planning period and a summary of the growing stock, growth, cuttings, silvicultural operations and biotypes having special importance for nature conservation. A FMP can focus on timber production, nature conservation or recreation, depending on the forest owner's wishes. The planning period is 10-15 years.

Apparently, the holding-specific FMP has dual objectives: firstly, it aids forest owners in their decision-making, and secondly it is an educational tool for guiding forest owners towards the implementation of the national forest policies. Some researchers (e.g. Kangas and Hänninen 2003, Hokajärvi *et al.* 2009) consider the FMP mainly as a forest policy instrument, which in the national scale in Finland has turned to be rather successful for decades, when owners while aiming mainly cutting incomes have guaranteed a smooth timber flow to forest industry (Donner-Amnell 2004).

A sort of turbulence might emerge between forest owners' and society's views, because of recent and still continuing value diversification, both among forest owners and more widely in society. The increasing plurality has challenged the traditional forest planning view and made it necessary to include, step by step, new objectives and tasks in planning systems (e.g. protection of valuable habitats and landscape values, and retention tree considerations on final cuttings).

THEORETICAL ORIENTATION: DEVELOPMENTAL WORK RESEARCH AND HISTORICAL WORK TYPES

Observations from public policy analysis show that the theoretical promise of a new policy instrument – such as, a new environmental policy – is rarely fully realized in practice, because any new policy development is always constrained by previous policy choices which have become institutionalized (Howlett and Rayner 2007). Consistently, new features can be seen as cumulative layers in the present forest planning systems, but the foundations of planning systems have remained rather untouched. In the long run contradictions may emerge between the layers, calling for more definite changes in the planning systems. Furthermore, the development of the practical planning is distributed along countryside, and implemented during thousands of everyday contacts between the planners and the owners. New policy input, is at best only one element in the development of the practical work.

The theoretical base of this study is provided by the developmental work research (e.g. Engeström *et al.* 1999, Chaiklin *et al.* 1999, Engeström 2001, 2005, 2006). The basic unit to be analyzed in the work development is an activity system. The activity system is an object-oriented, culturally and materially mediated conceptual model, which helps to analyze human activities as socio-technical entities. Even the the work practice is basically conducted individually, the model brings the social nature of the activity to the forefront as an essential

aspect of inquiry. Probably the activity system, in this study forest planning and advisory work, possesses a kind of ability for learning. However, this learning ability is limited because the elements of the activity system are deeply institutionalized along the historical course of development. The key argument of developmental work research is that expansive transformations are possible when externally aided, better than without intervention. The aim of external contribution is to empower workers, in all organizational levels, to reflect underlying historically accumulated, and often latent, premises of their everyday actions.

Contradictions, i.e. incoherence within the elements of the activity, are important sources for expansive development (Engeström 2001, Engeström *et al.* 2003). When the environment changes or when the system adopts new elements, the balance of the activity system is disturbed and this leads to inner contradictions whereby the old elements collide with new elements. The contradictions appear as disturbances, difficulties, contradictory requirements, etc. In a forest planning situation, expansive transformations can lead to new practices, e.g. in truly combining wood production and biodiversity maintenance, or incorporating aesthetic values in planning.

The development of activity systems proceeds through cycles of transformation, where the whole system is redefined. This expansive development follows a particular logic. Radical technological innovations, especially those that create a new infrastructure for production and exchange, are important reasons for change. Victor and Boynton (1998) and Freeman and Louca (2001) have presented theories about the development phases of work, which have been applied to analyze both local and general development (Virkkunen 2007). The theory of Victor and Boynton (1998) about the historical forms of work has been successfully applied as a tool to operationalize the development of activity (Engeström 2005, Virkkunen 2007).

The present study uses the model of Victor and Boynton in purpose to increase understanding of the practical forest planning activity. Development phases of forest planning in Finland are described via the symptoms of each theoretical work type, which are carefully looked for in written material and interview transcripts. The study aims at informing policy-makers and service-developers about the challenges that communication with family forest owners is facing in the near future.

RESEARCH METHOD

Guidelines for the interpretative analysis

“The Right Path” described in Victor and Boynton (1998), presents five types of the work in the history of the industrial production: craft, mass production, process enhancement, mass customization and co-configuration work. Each type of the work generates particular type of knowledge in organizations, which in turn enables specific types of expansive transformations, learning and organizational development, to the next level. The transformations between the types are labeled as development, linking, modularization and renewal, respectively. Thus, a central idea of the theory is that the activity must have attained the previous type before it is possible to move to the next.

Craft work applies personal know-how and tradition, i.e. tacit-knowledge, which is in people’s minds, not written explicitly in the procedural documents. The work is decentralized to individuals and small groups, keeping the organization adaptable and informal. The quality control is focusing directly on the end product enabling a flexible and immediate response to

customer's unique and changing needs. Craft work was typical when making useful objects by hand, but the worker's talent, experience and skills are the source of regeneration and development in all type of organizations. The main disadvantage of such organization is that it does not guarantee continuity: the knowledge comes and goes, quality can vary from individual to another, and the tacit knowledge may be difficult to manage.

Development to the next work type requires that tacit knowledge is explicated, thus organizational learning is focusing on understanding the work procedure, e.g. by the aid of time and motivation studies on the work process which in turn is divided into digestible sub-processes. The outsourced knowledge is consistently distributed in the organization, which requires written procedures and well developed information technology.

The development leads to transformation from craft work to *mass production*, which creates commodity value for customers and profits to firms around the world even it has taken some negative connotations. It has been an answer to craft's inefficiency, slowness and costs. Using the articulated and codified knowledge, workers and managers can share the knowledge about production quickly and easily. Work phases are separated to enable the replication and automation of the best working methods. This leads to the division of labor, where the work does not require specialized skills. Organizations are hierarchical, separating sub-processes from each other and "doers from thinkers". The quality control is focusing on the work process, and in particular on how exact and consistent it is with respect to work procedures. This control mechanism ensures a homogenous quality that is needed in mass commodity markets, but on the other hand its capability to react is slow when the quality demand from customers is increasing.

During the mass production "the practical knowledge" increases within organization: people learn about the work process and how to manage the quality of the product. Besides the inter-organizational learning, the customers when utilizing mass products learn about what kind of products they prefer and how much they are ready to pay for various products. Cumulative practical knowledge enables transformation to the next work type through *linking*, i.e. consistent incorporation of feedback from both workers and customers, and the procedures on how the feedback is taken into account in adapting the procedures consistent to increasing quality demand.

By *process enhancement* organizations can continuously improve quality of their products and thus get market advantage. Enhancement requires that practical knowledge is consistently applied to improve tasks and processes. "Learning by doing" generates advanced practical knowledge, which leads to changes in the process. Such a learning organization is team-based, wherein information exchange is intensive and reciprocal both horizontally and vertically. Quality control focuses on continuous improvement of the working process with respect to customer feedback.

Open information access increases the overall understanding about the work processes as a whole, in all levels of the organization. In addition, when the user-friendliness of information technology increases, previously strictly separated tasks of production processes can be implemented in teams confronting the customers directly. Therefore teams are better capable of immediately responding to the market demands: the "architectural knowledge is created". Such knowledge reveals structures of the work process so that new combinations or sequences can be constructed. In *modularisation* firms use this knowledge to manufacture added value for

different customers by dividing products into modules which can be flexibly integrated according to customer demand. Furthermore, work processes are re-configured to produce modules cost-effectively.

To produce precisely what the customer segments wants is the basic idea of *mass customization*. Personalization of a product or service is the demand of precision markets. The question is how to respond on every customer's unique needs at profitable price. In organizations this requires focus on constantly changing and unpredictable product and service requirements. Hence the quality control informs the organization's capability to react and innovate. A dynamic network, with many sub-contractors, forms a renewable organization suitable for mass customization. Combining low cost with customization and staying more focused on customers are advantages of mass customization. Still the basic logic of adaptation to customers' needs is "a-priori": the organization interacts with customers continuously to understand their hopes, produces a tray of products to fulfill predefined needs. Thus the mass-customised products are not adapted to the needs of any particular customer but to the compound needs of certain discerned customer segments.

The "configuration knowledge" accumulated through mass customisation processes, enables an incremental development of smarter and smarter modules for smaller and smaller customer segments. Finally the logic of adaptation can be turned to *a posterior*. Then the intelligence needed in the adaptation is constructed in the product or service itself. The product is not predefined but *co-configured* together with customers along the production process. The products or services are "customer-intelligent" when adapting to the changing needs of the users. In co-configuration, continuous information exchange between customers, producers and service or product combinations is needed, resulting in mutual learning. The latter means that products and services dynamically and continuously respond to the needs without forcing the customer or the organization to intervene (Victor and Boynton 1998, Engeström 2005).

Data about historical development of forest planning in Finland

This research report was compiled by analyzing texts related to forest management planning and seven essays by senior planning professionals, considered as key informants of the activity at hand. The development of planning activity was first outlined by articles of "Tapion taskukirja" – a handbook series for forestry professionals, students and forest owners – from years 1958 to 2002. This data consisted of 15 articles. After the analysis of this material seven experts were asked to write an essay about the development of forest planning from 1970s until today or since they have been working related to forest planning. The experts were asked to describe their own experience and point of view and give some background and reasoning.

These essays deepened the analysis to outline the changes of forest planning from the 1970s up to the new millennium. Finally more extensive literature work was employed in the final formulation of the development. About ten reports and memoranda of working groups were used to grasp details and to inspect backgrounds. Altogether 300 pages of textual data were organized and analyzed.

THE STORY ABOUT FOREST MANAGEMENT PLANNING IN FINLAND

According to our analysis, six rather clear phases can be recognized from the development of forest management planning for Finnish private family forests. The phases are not strictly

chronological, because the development normally consists of back-and-forth dynamics. Rather, the phases present a conceptual tool to understand the main driving forces, which have modified the planning of today.

FMPs holding by holding - 1960s

The Finnish forest planning originates from the German forest mensuration tradition. From the first half of the twentieth century detailed instructions for forest classifications and tables for forest mensuration were available and used for large scale forest estates, but not in small scale. The content of a FMP was first introduced for family forests in 1950s. First the plans were prepared directly for single forest holdings, meaning that the forest data were collected from one holding at a time. Basing on this data plans were constructed and delivered immediately to the owners.

According to the planning guidelines, all formalism (except for uniform presentation of data) was undesirable in planning, because particular features of the holding had to be taken into account, (Lihtonen 1959). So there was certain data on forms but it was suggested to include verbal explanations and instructions. The forms for inventory and presentation model of data were released by Tapio (Central Forest Centre, nowadays Forestry Development Centre Tapio). So-called “Forest management plan” (“ordinary plan”) was for larger and more professional estates, and a forest holding plan (a kind of simple forest notice) was adopted for smaller family forests and included stand-wise information about site-classes and recommendations for cuttings and silvicultural treatments. There were some reference values about allowable cut (% of total volume) and sustainable annual forest regeneration area (% of the productive forest land). The planning task was to reconcile stand-wise treatments to fit holding level reference values but consideration was used to take the special features of the holding in account. First computer-aided planning applications became available at the end of 1960s to help forest management planning for bigger estates, which soon after that catalyzed an intensive development of the planning activity system.

Regional planning (1970s - present)

The practice of forest management planning in its present form in Finland originates in the 1970s, when “regional forest management planning” was launched. Regional planning scheme was included in legislation obligating the relevant forestry organizations to implement regional centralization when constructing plans for forest improvement works. Due to that also forest management planning for private forest holdings has been conducted on a regional basis.

The continuity and efficiency of the planning work and the integration of various planning levels were mentioned as the objectives of that regional planning. The aim was also to concentrate on areas where the landowners were passive as regards to systematic silviculture. The regional planning is not obligatory for landowners but it is a promotional activity on one hand and a means to supervise compliance with forestry legislation on another. The regional planning and holding-specific plans constructed basing on regionally collected data were financed by the State. So the landowners only pay a share of the costs when buying the holding-level plan.

A new computer system, called *MTS/Alue* (regional forest management planning, FMP) made it possible to collect, save and utilize regional data flexibly and to construct holding-specific FMPs from the data afterwards. Consequently, separate phases of the planning work process detached from each other. For the planner early springtime has been reserved for the preparation of data

collection, Spring, Summer and Autumn for field work and Winter for extension and delivering holding-specific plans; map-making and plan-construction were differentiated to office workers who also printed out the plan documents. The use of computers enabled automated calculations and made the end products uniform. The IT system was equal in the whole country.

Extension work with landowners and other forest professionals were tightly connected with the regional planning. Regional group advisory meetings were organized with other forest professionals on the region. The original aim of the regional approach was to enhance co-operation between landowners to decrease costs of forestry operations by the aid of joint ventures in implementing the plan. Co-operation did not success in timber trading, but forest improvement (ditching and forest road construction) activities are still conducted for several owners and hundreds of hectares at a time.

Personal guiding on focus (1980s - present)

Forest management planning, advisory services and other service functions were raised on table increasingly after the National Forestry Strategy called Forest 2000 (“Metsä 2000”). At least partially the strategy change was due to rather intensive private forestry oriented research during the 1970s (Reunala and Tikkanen 1972, Hahtola 1973, Järveläinen 1974), concluding that silviculture, forest owners’ activeness on forest improvement and felling operations depends on how well forest owners know their forests. The most efficient way of increasing forest owners’ knowledge of their forest holding was to provide them with holding-specific FMPs and advisory services together with planning.

Individual advisory services as a part of forest management planning became the prevailing practice in the 1980s. One of the new objects in the new “Taso” planning system in the 1980s was to make plans clearer and more understandable to forest owners. In the Taso system there was also capability to construct different plan documents for different owners. Also, the calculation features of the Taso system were thought to serve the advisory function and interaction by taking into account forest owners’ objectives better than before. The amount of full-time planners in forest management planning was at maximum level at that time. To gain more effectiveness the landowner became more on the focus of planning, but still inventory was dominating the planning process.

Diversification of the objectives (1990s - present)

The diversification of the objectives related to forest use was, of course, also evident in forest management planning. The concept of sustainability came to wider use in strategic programs, right after the Rio de Janeiro Declaration. All programs officially promoted the economic, ecological and socially sustainable use of forests. Multiple-use was adopted in the preparation of the Metsä 2000 program in the 1980s, but mostly as a marginal term, while the emphasis remained on the securing of the favorable operational conditions for forestry (Ollonqvist 1998). In the Regional and National Forest Programmes from 1998, the purpose has been clearly to safeguard forest-based jobs, forest biodiversity, and recreational function of forests. *The Finnish Forest Act* (1997) introduced the preservation of biological diversity alongside sustainable yield. The operational environment became larger and changed rapidly in the mid 1990s, posing a pressure towards management planning as well.

The information content of the planning system diversified when introducing the Solmu/Luotsi planning system at end of 1990s. Solmu/Luotsi is a GIS system developed for application on

personal computers. The number of parameters depicting the property features of the forest doubled. The official forest strategy gave a vision that, aided by the planning and advisory, *"all forest owners make their decisions conscious about different utilities and management needs of their forests* (Ministry of Agriculture and Forestry 2008, p.5), thus the emphasis was put more on discovering special values in the forests, including, for example, valuable natural habitats and recreational values. The clarification of forest owners' objectives and taking into account values other than economic ones have always been mentioned in the planning documents, but indeed, from the 1990s the planning guidelines have included more emphatic phrases about the needs of the owner and the role of the planning as a tool to aid owners in their decision making.

Alongside with the changing value structure among forest owners, and in society in general, more and more focus was put on the diversification of forest owners' objectives due to urbanization, retirement and the fragmentation of holdings. The increasing number of passive owners is one of the current challenges facing the forest policy.

Quality management system (2000 – present)

Another much-debated development objective of the planning, especially after the economic recession after the turn of 80s and 90s, was the need to improve the quality and cost-effectiveness of the planning. The discussion got concrete forms in the beginning of the third millennium, when planning organizations began to construct consistent quality management systems. One by one Forestry Centres adopted ISO-quality standards. This process obligated Forestry Centres to consistently focus on the feedback procedure, how to collect feedback and take it into account. Numerous development teams were founded, for explicating the practical work process. A standard was that also representatives of grass-level workers were nominated to those development groups. The organizations referred themselves as team-organizations. Due to an increased closeness with customers, and more user-friendly planning software, the delivery cycle of the planning shortened. The direction of the development seems now be back from the differentiated work division towards a more holistic service, where rather individual teams produce a whole service to forest owners, more flexibly than before.

Customer segmentation and service orientation in development debate (2005 – present)

The continuous process improvement, especially because of customer feedback system, is increasing the know-how in planning teams, not only about what kind of planning service) is demanded by different customers, but also about how that service is most beneficially produced and delivered to the forest owners.

Consistently during the recent years, quite a development process has been established to develop entire planning service products. From 2005 a new phase has been included in the planning process descriptions: customer segmentation. According to work-instructions the planners should now classify customers into two different segments, those knowing their forests well and those just familiarizing themselves with their forest property. According to this simple classification one of two service protocols should be followed in interaction with the forest owner. The purpose of the segmentation is to improve the impressiveness of the planning service, but still keep the tailoring simple enough to attain masses of forest owners in cost-effective process.

Thus, the diversification of the service palette of forest management planning has only just begun. The need for further customization is increasing along with diversification of the objects and the owners. Therefore the mass customization project is rather intensive just now. More precise foundations for customer segmentation are sought for and a new service tray is under development, with the special focus on the internet-based services.

DISCUSSION AND CONCLUSIONS

The three development phases of the practical forest planning in Finland can be rather clearly equated with three of the work phases by Victor and Boynton (1998, Table 1). Although the mass-customization is currently dominating the practical development discourse, it will most probably not be the end point of development. Until now the co-configuration can be seen only in the present planning research debate but not yet in practice.

In the co-configuration type of the work the producer and the user are engaged in a constant dialogue and modify the content of the product and service wholeness as a result of mutual learning (Victor and Boynton 1998, Engeström *et al.* 2003, Virkkunen 2007). In other words, there is no more any *a priori* given service protocol to be followed but the owner and planner jointly tailor the service along the process. The distinctive characteristics of joint development are a product or service with a long life cycle, even one which will never be finished; continuous adjustment to the user's activity; 'client smartness' embedded in technological solutions; and the requirement of continuous re-configuration between the user, the producer, and the product itself (Victor and Boynton 1998, Engeström 2005).

The step to this work type is even more challenging than between previous ones, also in terms of forest planning. Will it ever be possible until the mass-customization process has accumulated enough understanding of how to proceed in interaction with forest owners along the service process, i.e. increased dialogical configuration knowledge about forest planning service. The main challenge in the development towards co-configuration is the fact that the underlying assumptions orientating interactive acts in planning process ought to be turned upside-down. Forest owner's role should change, from customer to initiator in the process which is continuously adapted through sensitive feedback-response sequences. The planner is not only an expert, but also a moderator, producing still themselves a part of the service elements, but serving also as link between dynamic network of service producers and forest owners.

Co-configuration is a challenge for development work, but not yet a finished model for implementation. However in the forest planning research so far only very first steps towards describing such a planning procedure have been made. E.g. so-called adaptive decision analysis framework (ADA) aims at explicating what co-configuration might mean in forest planning case (Leskinen *et al.* 2009, Hujala *et al.* 2009). The ADA introduces different adaptation levels: First a-priori adaptation is basing on the pre-planning information about the owner and about the planning environment. In practice this adaptation means the planner's decision making about the service protocol to enter into planning interaction. Second, *a posteriori* adaptation means adjustment the process basing on the feedback information along the process. Depending on the amount of the "mismatch" figured out in feedback analysis the adaptation occurs through learning in computational (planning calculation systems), social (interaction during present service) or organizational learning (e.g. about the service product range or about the network of professionals offering planning services).

Table 1. Corresponding features of historical work types³.

The type of work	Outlining the type	Features in data
Craft	Informal and organic organization Collaborative professionals or craftsmen Novelty; unique products Tacit knowledge	Holding-level procedures and plans one by one Focus on verbal descriptions with tables and forms Formulas, tables and models for calculation, but not for the end product One professional making the whole process (inventory, plan and map)
Mass production	Increasing volume Functionally defined hierarchical organization Rationalized practices Division of labor Exact, constant work process Standardized products for “average customer” Articulated knowledge Separating doers and knowers	Regional way of inventory (RFI) covering all estates in the region Standardized product (plan) The exact process flow of planning Detaching calculations (computing) and map-making to office staff A focus on group advisory and regional co-operation instead of individual owners
Process enhancement	Flexible mass production Customer, product, process interaction Reciprocity and feedback Quality, value chain integration Learning by doing Practical knowledge Doers as knowers Team organization	More user-friendly IT Customer feedback Systematic continuous improvement of the process ISO-quality management system Improving the product (plan) and the process Workers’ experiences
Mass customization	Modularization Precision markets; distinct service products Architectural knowledge	Customer segmentation Product range (special plans with the focus on game, multiple use etc.) Internet plans
Co-configuration	Negotiation about the service Long life span products Dialogical configuration knowledge The client-intelligence and learning products	Individual tailoring during the service Adaptability

To conclude, behavioral roles of the owner as an object of the service or extension work and the planner as an expert are deeply rooted in common ground developed during the previous work phases, especially during the mass-production. A common ground defines initiating and responding in planning acts (see Virkkula *et al.* 2009). It can be assumed that a lot of repetition

Source: Modified from Victor and Boynton 1998) and forest management planning work in Finland.

in social interaction level (between owner and planner) is needed to enable organizational learning outwards from the dominating roles. Probably the most critical linkage is the development of a proper set of service options to be offered for forest owners. First of all this will generate owner-driven planning culture when empowering forest owners to genuine decision making regarding to planning procedure. Secondly it will enable planners to learn about the needs of the owners and also about how to conduct owner-driven interaction instead of an expert-led one. In the course of time the service range will get diversity and an increasing amount of flexibility, and step by step a joint decision making will be integrated in the service products. Whether the development will progress to genuine co-configuration type of work or not will be seen. Anyhow, this development calls for action-oriented forest planning research to accelerate the development.

REFERENCES

- Bemelmans-Videc, M.L., Rist, R.C. and Vedung, E. (eds.). 1998. Carrots, sticks, and sermons: Policy instruments and their evaluation, Transaction Publisher, New Brunswick, NJ.
- Bouriaud, L. 2001. Sustainable Forest Management: with or without Privately Owned Forests? A Romanian Case Survey In: Niskanen, A. and Väyrynen, J. (eds.). Economic Sustainability of Small-Scale Forestry. EFI Proceedings 36, pp. 143–159.
- Chaiklin S., Hedegaard, M. and Jensen, U.J. (eds.). 1999. Activity Theory and Social Practice: Cultural Historical Approaches. Aarhus University Press, Aarhus.
- Donner-Amnell, J. 2004. To be or not to be Nordic? How Internationalization has affected the character of the forest industry and forest utilization in the Nordic Countries. In: Lehtinen, A., Donner-Amnell, J. and Sæther, B. (eds.). Politics of Forests: Northern Forest-industrial Regimes in the Age of Globalization. Ashgate Publishing, Aldershot, pp. 179–204.
- Engeström, Y. 2001. Expansive Learning at Work: toward an activity theoretical reconceptualization. Journal of Education and Work. Vol. 14, No 1, pp. 133–156.
- Engeström, Y. 2005. New forms of learning in co-configuration work. In: Engeström, Y. Development work research: Expanding activity theory in practice. Inter cultural-historical human sciences, Volume 12. Lehmanns Media, Berlin. p. 437–448 (Chapter 12; available also at <http://is2.lse.ac.uk/Events/esrcseminars/engestrom.pdf>).
- Engeström, Y. 2006. Development, Movement and Agency: Breaking away into Mycorrhizae Activities. CHAT Technical Reports No. 1. Building Activity Theory in Practice: Toward the Next Generation Center for Human Activity Theory, Kansai University. Available at: http://www.chat.kansai-u.ac.jp/publications/tr/v1_1.pdf. [Accessed April 6, 2009.]
- Engeström, Y, Miettinen, R., Punamäki, R-L. 1999. Perspectives on Activity Theory. Cambridge University Press, Cambridge. 476 p.
- Engeström, Y., Puonti, A. and Seppänen L. 2003. Spatial and temporal expansion of the object as a challenge for reorganizing work. In: Nicolini, D., Gheraldi S. and Yanow, D. (eds.). Knowing in Organizations. A Practice-based Approach. ME Sharpe Publishers, Armonk, NY.
- Freeman, C. and Louca, F. 2001. As times goes by. From the Industrial Revolutions to the Information Revolution. Oxford University Press: Oxford.
- Hahtola, K. 1973. The rationale of decision-making by forest owners. Acta Forestalia Fennica 130. 112 p.

- Hokajärvi, R., Hujala, T., Leskinen, L. and Tikkanen, J. 2009. Effectiveness of Sermon Policy Instruments: Forest Management Planning Practices applying the Activity Theory Approach. Submitted to *Silva Fennica*, 31 p.
- Howlett, M. and Rayner, J. 2007. Design Principles for Policy Mixes: Cohesion and Coherence in ‘New Governance Arrangements’. *Policy and Society*, 26(4): 1–18.
- Hujala, T., Kurttila, M., Tikkanen, J., Leskinen, P. and Leskinen, L.A. 2009. Adaptive consultation: a tool for recognizing family forest owners' amenity values. Proceedings of the IUFRO 3.08 Small Scale Forestry Symposium, June 7-11, 2009, Morgantown, West Virginia.
- Hyttinen, P. 2001. Prospects for Small-Scale Forestry in Europe. In: Niskanen, A. and Väyrynen, J. (eds.). *Economic Sustainability of Small-Scale Forestry*. EFI Proceedings 36, p. 21–27.
- Järveläinen, V.-P. 1974. Forestry behaviour of private forest owners in Finland. Finnish Forest Research Institute, Rep. 222. (In Finnish with English summary.)
- Kangas, J. and Hänninen, H. 2003. Tilakohtainen metsäsuunnittelu – metsäpolitiikkaa vai metsänomistajien päätöstukea? (Holding-specific forest planning – forest policy or decision support for the owners?) *Metsätieteen Aikakauskirja* 2/2003: 153–156.
- Leskinen, P., Hujala, T., Tikkanen, J., Kainulainen, T., Kangas, A., Kurttila, M., Pykäläinen, J. and Leskinen, L.A. 2009. Adaptive decision analysis in forest management planning. *Forest Science*, 55(2): 95-108.
- Lihtonen, V. 1959. Metsätalouden suunnittelu ja järjestely (Forestry planning and organization). Werner Söderström Osakeyhtiö. Porvoo. (In Finnish.)
- Ministry of Agriculture and Forestry. 2008. Maa- ja metsätalousministeriön metsävaratiedon ja metsäsuunnittelun strategia 2008–2015 [Strategy for forest resource data and forest planning by Ministry of Agriculture and Forestry]. 10 p. Available at: http://www.mmm.fi/fi/index/julkaisut/muut_julkaisut.html [Accessed 12.11.2008]. (In Finnish).
- Ollonqvist, P. 2001. Forest policy objectives and institutions in Finland 1917-1997 – success story of forest policies in Finland. In: Palo, M., Uusivuori, J. and Mery, G. (eds.). *World forests, markets and policies; World Forests*, Vol. 3. Kluwer Academic Publishers, pp. 437–439.
- Reunala, A. and Tikkanen, I. 1972. Metsätalonomistajat metsätalouden edistämistoiminnan kohteena Keski-Suomessa (Non-farmer forest owners and promotion of private forestry). *Folia Forestalia* 134, 32 p.. (In Finnish with English Summary.)
- Schneider, A. and Ingram, H. 1993. Social construction of target populations: implications for politics and policy, *American Political Science Review* 87: 334–347.
- Victor, B. and Boynton, A.C. 1998. *Invented here. Maximizing Your Organization's Internal Growth and Profitability*. Harvard Business School Press, Boston.
- Virkkula, O., Hujala, T., Hokajärvi, R. and Tikkanen, J. 2009. Are forestry consultation meetings owner-driven? – Analyzing the interplay between the owner and the planner. Proceedings of the IUFRO 3.08 Small Scale Forestry Symposium - June 7-11, 2009, Morgantown, West Virginia.
- Virkkunen, J. and Pihlaja, J. 2004. Distributed Systems of Generalizing as the Basis of Workplace Learning. *Journal of Workplace Learning*, 16(1-2): 33–43.
- Virkkunen, J. 2007. Collaborative development of a new concept for an activity. *Activités*, 4 (2): 158-164, <http://www.activites.org> [Accessed March 29, 2009.]

ADAPTIVE CONSULTATION: A TOOL FOR RECOGNIZING FAMILY FOREST OWNERS' AMENITY VALUES

Teppo Hujala¹, Mikko Kurttila², Jukka Tikkanen³, Pekka Leskinen⁴ and Leena A. Leskinen²

Abstract--Family forest owners associate multiple values with their woodland property. Without underestimating the monetary utilities that forests frequently produce, owners also gain many emotional amenities from their forests. This paper suggests that serving smoothly owners' post-productivist views and multi-faceted preferences is a key to increasingly recognize, respect, and take into account their forest-related amenity values. Practical examples of alternative decision support service options illustrate how different qualitative and quantitative methods can adaptively be tied together and contextually tailored for each owner. For example, a communicative forest management planning procedure may contain a value-focused situation analysis discussion, a numerical preference rating task, a vivid field trip with a consultant, and an interactive evaluation of alternative plans via internet. The empirical results of recent research on family forest owners in Finland suggest that the first level of adaptation, a priori segmentation of owners as consultation customers, may be based on owners' decision-making environment and ownership strategy. In turn, more detailed preferences can be taken into account within the service chains through customer empathy and social learning, as the second level of adaptation. The overall conclusion emphasizes the role of systematic feedback management and organizational learning in developing owner-driven consultation service schemes for small-scale family forestry.

INTRODUCTION

Alongside economic gains, family forest owners enjoy their forest ownership in many ways. For example, an intrinsic value of owning land, a trans-generational view when managing forest stands, and an aesthetic pleasure of the artwork of nature make owners feel good about their forest holdings (cf. Hujala *et al.* 2009). Fostering these perceived benefits is even more important in the current era of more and more urbanized owners. These owners are very likely trying to find a new balance for their social identity as forest owners (cf. Hujala & Tikkanen 2008). Therefore it is essential for the owners that the multi-faceted possibilities of their forests are illustrated and discussed well.

The transition to post-productivism (cf. van der Leen & Groot 2006) seems to increase the hidden value conflict between forest owners and the system of forestry operations, represented

¹ University of Helsinki, Department of Forest Resource Management, P.O. Box 27, FI-00014, Finland, tel +358 10 211 3288, fax +358 40 540 0854, Teppo.Hujala@helsinki.fi

² Finnish Forest Research Institute, Joensuu Research Unit, Finland

³ Oulu University of Applied Sciences, School of Renewable Natural Resources, Oulu, Finland

⁴ Finnish Environment Institute, Research Programme for Production and Consumption, Joensuu, Finland

by forestry professionals. The forestry sector as a whole is in transition in the Nordic Countries, including the decreasing production of pulp, paper, lumber, and other traditional forest industry products (Donner-Amnell 2004, Rannikko 2008). It seems that this has so far not affected the forestry branch, which still follows the idea of productivism in forests: Hokajärvi *et al.* (2009) have addressed that the dominating goal of forestry consultation is still to increase timber production, while challenges of complexity and diversity to foresters' work have been acknowledged notably earlier (Tipple & Wellman 1991). This observation reflects the slow renewal of complex organizations, which has also been illustrated in Kaufman's *The Forest Ranger* (2006). On the other hand, Pregernig (2001) has addressed the major role of forestry professionals' personal value patterns in the fulfillment of forest policy instruments. Thus, the tensions between forestry system, foresters, and forest owners are assumed to evolve as a product of organizational and individual characteristics.

While productivism still dominates the professional forestry enterprise, other sectors of society, including forest owners, have at least to some degree, shifted to post-productivism. New generations of family forest owners usually have different attitudes to their forests than their parents and forestry professionals have had (Laurén 2007). When aesthetic and emotional attitudes toward nature are valued high instead of the material duties and exploitation, critical attention is increasingly being paid to actions, such as harvesting, which seem to cause damages in nature.

Consequently, it seems that forest owners consider post-productivist values more than forestry professionals. This conclusion should however not be oversimplified and interpreted as owners' neglecting of monetary utilities. Rather, it raises a concern how to develop the decision support for those owners who more or less emphasize non-monetary goods as ownership objectives. Besides, there are also problems to manage post-productivist values, such as the ecological ones. Studies of environmental conflicts have analyzed forest owners' experiences and observed frustrations concerning biodiversity conservation policy and practices (e.g. Hiedanpää 2004, Jokinen 2004, Leskinen *et al.* 2008, Paloniemi & Varho 2009).

One possibility to alleviate the bottleneck between forest owners and the duties carried out by forestry professionals is to develop adaptive decision support tools that include also post-productivist forest values.

Objectives

This paper introduces adaptive consultation as a tool for better serving the occurring decision-aid needs of family forest owners. After defining relevant concepts and illustrating the theoretical frame, three practical decision-aid cases, representing different levels of decision-making and different perspectives on amenity values, will be described and discussed in the light of adaptive consultation.

BUILDING THE CONCEPT OF ADAPTIVE CONSULTATION

Available communicative decision-aid services that are targeted to family forest owners (e.g. holding-level forest planning, operational stand-level planning, the delivery of an updated forest fact-sheet) are seen here as socio-cultural affordances – see Gibson (1979) for the original definition. According to Chemero's (2003, p. 182) interpretation, affordance "...is a resource that the environment offers any animal that has the capabilities to perceive and use it". Analogy

with forest owners' case, i.e. perceivable and usable resources in owners' decision-making environment (Hujala *et al.* 2007a) is obvious. In other words, it is assumed here that in forestry consultation, supply creates demand, i.e. owners use those services that are available: they may not seek better ones, and the possible value conflicts remain hidden until they escalate. It is the duty of researchers, policy-makers and service developers to recognize and foresee these patterns in time.

The offered services have been suggested to be adapted according to owners' decision-making modes (Hujala 2009). These different modes reflect various levels of sharing the decision-making power and desire to learn, and result in different communication preferences (Hujala *et al.* 2007a, b). Thus, the concept of decision-making mode illustrates the context-specific decision-making behavior. In the joint, adaptive communication process by owners and their consultants, tensions between owners' and foresters' perspectives (e.g. distrust or incomprehension) may occur and reveal genuine communication needs which thus far have remained unfulfilled (see Hujala & Tikkanen 2008).

Owners' cognitive structures (e.g. values, motives, attitudes, goals) and situational factors (e.g. time, guidance, and labor available) are defined here as an entity in which owners adaptively apply different decision-making strategies and use alternative decision support services in their occurring decision problems (Hujala 2009). Neither the cognitive nor the situational factors but their adaptive interplay evokes the concrete decision-aid preferences, and thus motivation to grasp service affordances.

The Adaptive Decision Analysis (ADA) (Leskinen *et al.* 2009) is a theoretical and methodological framework that can be utilized to support adaptive decision making and the adaptive development of decision-support procedures. It aims at taking into account the intertwining of cognitive and situational characteristics of owners' decision-aid needs as well as foresters' need to learn how to diversify their communicative services. In particular, by utilizing ADA the use of different decision support tools can be adapted to each decision problem and to the available sources of information about the variables that are important in efficient natural resources management. The adaptation process includes iterative phases at different levels. In the activity level, a broad socio-cultural and inter-organizational system is maintained. In a forest planning activity case, a so-called action-level is a realization of the activity, e.g. via analyzing the situation, defining the objectives and choosing a framework to work with, one concrete example being forestry strategy formulation for a family forest holding. Further, a so-called operations-level includes phases of an action, e.g. a preference rating task in the forest planning case. The capability to adapt lies in the feedback management system, which functions in computational, social, and organizational levels (Leskinen *et al.* 2009). In other words, an adaptive system analyzes the successfulness of each phase of an action and each realization of the activity. Figure 1 illustrates the components of ADA in a simplified manner.

Essentially, meaningful and effective co-usage of numerical and discursive methods is the practical aim of ADA. For forestry professionals this means new and emerging skill requirements such as facilitation, problem structuring, decision-modeling, and advanced-planning calculations.

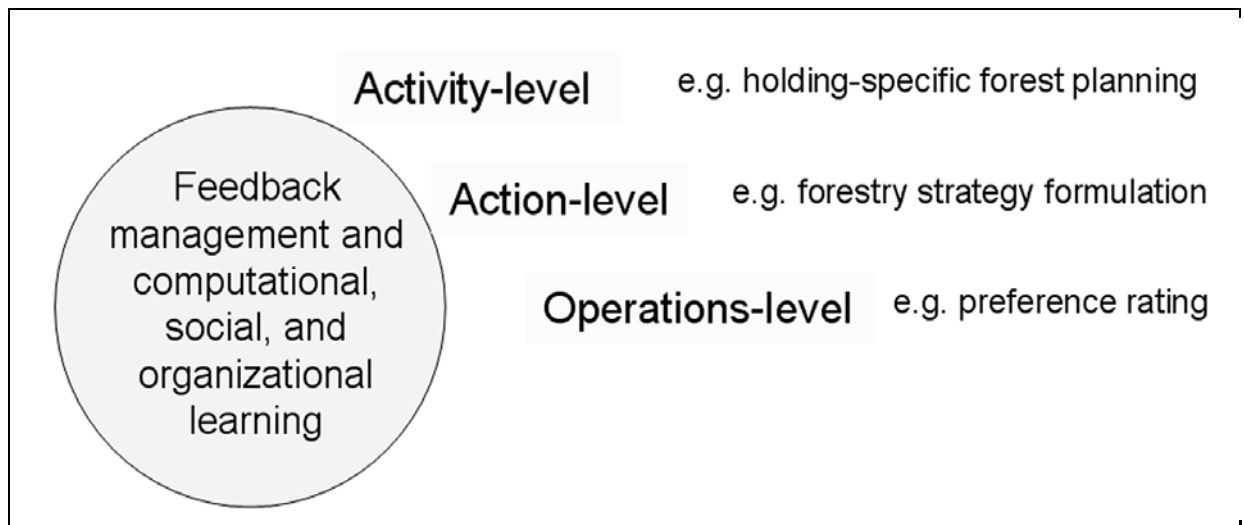


Figure 1. A simplified structure of Adaptive decision analysis, based on a more detailed description in Leskinen *et al.* (2009).

PRACTICAL EXAMPLES AND DEVELOPMENT CHALLENGES

Forest owners' amenity values may be relevant in different scales of decision-making and various concrete decision problems. This section illustrates three examples in which adaptive consultation may be used in order to recognize and take into account the owners' amenity values in the context of forestry decision making. The exemplary cases are 1) focusing on scenic values in long-term considerations of stand-level treatments, 2) considering the opportunity costs of different amenity values in holding-level forest planning, and 3) balancing between gains and losses to generate a reasonable compensation fee for recreational values trading.

Case 1: Scenic values in stand-level treatments

A new forest owner has ordered an introductory communicative planning service from a local forestry consulting agency. He is interested in knowing, how forest grows, how forestry works, and how he can manage his woodland property. During a vivid field trip with a consultant he learns some basic terminology as well as some preliminary grounds for deciding about forestry treatments. In a mature spruce stand they discuss final cuttings and regeneration activities. Suddenly the owner becomes worried about the possible loss of the scenic beauty on that stand. Here the landscape thus carries an amenity value which is important to the owner.

Following the idea of adaptive consultation, the consultant recognizes the owner's worry as essential feedback, communicating inadequacy of the field trip in serving the owner's motivations. The consultant suggests that maybe it would be helpful to continue the discussion over a computer and simulate the development of the harvested stand (see Pykäläinen *et al.* 2006). Figure 2 illustrates a simulated 30-year period of one treatment alternative. It shows how the mix of natural and artificial regeneration yields a young stand, which will be thinned etc. Along with the growth calculations, the owner can now ask further questions about the treatment alternatives, ecological aspects and the expected profit. He can also imagine the effect of forestry treatments and forest growth on the scenery. As a result of the illustrative consultation, he may decide to cut only half of the stand, and he will be more confident about what is expected in terms of both money and landscape.

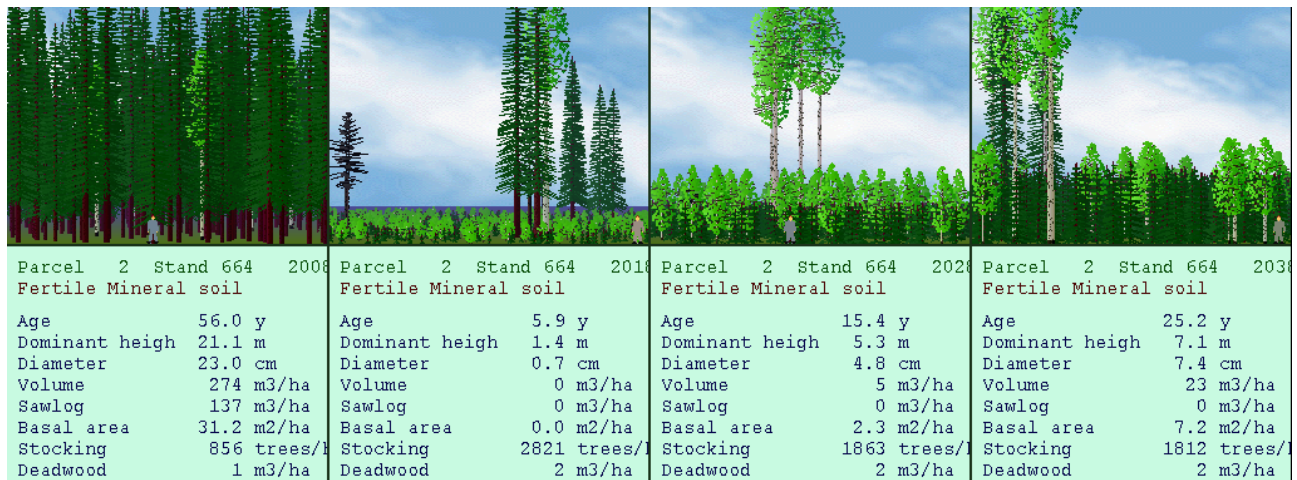


Figure 2. An example from a spruce-dominated stand. Final cut with high tree retention carried out during the first 10-year period (i.e. year 2013), with non-commercial thinning of the young stand in the second 10-year period has a predicted total yield of 23 m³/ha at the end of the planning period (2038).

Case 2: Uncovering the opportunity costs of various amenities in context of holding-level forest planning

A moderately experienced forest owner has ordered a forest management plan for his holding. He aims at gaining economic profit out of his forests, but simultaneously he incorporates several different amenity values with some particular stands. During a situation analysis discussion (a multi-faceted feedback to foster social learning in terms of ADA) based on an owner-driven cognitive mapping task (Tikkanen *et al.* 2006), the forestry consultant learns that maybe this owner may benefit from opportunity cost considerations. He presents a table with V-values (Pukkala 2007, Metsämonex Ltd. 2009), which describes the yearly losses or profits that result from just growing the forest and not doing the suggested treatments with different interest rates (Table 1).

The table helps the owner and the consultant to discuss concretely about the expected gains and losses: basically, the smaller the negative V-value, the more urgent is the suggested treatment in order to avoid monetary losses. However, this particular owner associates strong amenity values with the stand 182 (nice view from his living room window, children's playing ground, wife picks mushrooms there etc.). This is why he wants to keep it unharvested and concentrate treatments elsewhere, e.g. on stands 184–185. The figures in the table help the talkers to openly discuss the place-specific amenity values, and the opportunity costs of these values can be seen and summed up. The owner can express his concrete preferences, and the consultant can take them into account in the final plan. The table and this kind of examinations do not, however, consider the benefits resulting from these values nor the possible interdependencies between holding's stands.

Table 1. The example of V-value calculation by using different interest rates (source: Metsämonex Ltd. 2009). The higher the interest rate demand, the more stands should immediately be cut. Column “cutting removals” corresponds to typical cuttings (treatments in the Figure) implemented in Finland.

Stand number	Stand area, ha	Age, years	V-values by different interest rates					Cutting removal, %	Treatment
			1%	2%	3%	4%	5%		
177	0,3	62	29	17	6	-6	-17	93	Seed tree removal
178	0,9	69	303	216	129	42	-45	98	Clear cutting
179	0,6	70	131	16	-99	-214	-329	98	Clear cutting
180	0,2	63	85	49	14	-21	-57	45	Thinning
181	0,5	63	79	33	-13	-58	-103	46	Thinning
182	2,2	118	61	-311	-682	-1054	-1425	95	Clear cutting
183	0,2	53	65	36	8	-20	-49	50	Thinning
184	0,7	102	51	-17	-86	-154	-223	93	Clear cutting
185	0,4	102	30	-37	-104	-171	-238	96	Clear cutting
186	0,9	92	127	4	-118	-240	-362	96	Clear cutting
187	0,2	63	89	64	39	15	-10	55	Thinning

Case 3: Recreational values trading: generating a reasonable compensation fee demand

The same moderately experienced forest owner from Case 2 has now decided to sell timber from his holding. He receives information from a timber buyer that there exists a project from which it is possible to get monetary compensation from producing recreational values in certain forests (see Central Union of Agricultural Producers... 2009). Due to a good location of the holding, there are at least two stands that could be suitable for the project. The utilization of this possibility demands that forest owner himself is active: He must submit a written offer to authorities, where he expresses to be willing to offer certain forest areas for this purpose (and to at least delay the clear-cut of these stands). In addition, the written offer should include a compensation fee demand of the forest owner. The compensation fee is affected by several factors, of which the most important is the recreational value of the stand and the opportunity cost that results from not clear-cutting the stand (which is, from the economic perspective, considered to be the most profitable treatment). In addition, owner’s management goals affect the acceptable fee.

In this situation, the owner needs versatile decision support from the forestry consulting agency, thus adaptive consultation scheme is once again called for. The consultant first defines the scenic beauty and recreational value of the stand (e.g. Pukkala 2002), which is a function of growing stock characteristics (e.g. number of stems, volumes of large-diameter deciduous trees etc.). However, to make the results understandable for the owner, the scenic beauty index is transformed to a star-scale; the more stars the forest stands gets, the more valuable it is for recreational purposes. In order to examine the opportunity costs, two kinds of figures are calculated for the two possibly suitable stands. First, the V-values are again useful for this purpose. In addition, because it is possible to offer the forest areas for recreational purposes for a temporary period (e.g. 10 years), also holding-level calculations (e.g. Kurttila *et al.* 2006, 2008)

that take into account the multiple goals of the owner as well as the production possibilities of the whole forest holding, are very useful in this situation.

Table 2 shows the results in a condensed form. The forestry consultant of course justifies these figures and also helps in defining the compensation fee demand. The table with the most essential information forms a meaningful base for asking questions, giving feedback, and adapting the consultation process. In this case, the negotiation position of the owner seems to be at least moderate, the recreational values of the stands are high (the other stand received the highest possible value, five stars), whereas the opportunity costs are also moderate. The table also shows that these areas represent only 16% of the mature forest area of the holding, indicating good cutting possibilities in other parts of the holding. As a result, the forest owner could present a compensation fee demand that is something around 100-150 €/ha/a. However, behind this assumption is that there are no other factors that affect the owner's decision making. In addition, due to limited budget, there exists a rather high competition between forest owners, which may result in a lower compensation fee.

Table 2. Summary of the decision-support material delivered to the forest owner.

Stand	Recreational quality of the stands	V-value with 3% interest rate (€ ha ⁻¹ a ⁻¹)	Proportion of the area of holding's mature stands (%)	Holding-level opportunity cost (€ ha ⁻¹ a ⁻¹)	Forest owner's negotiation position *
184	★★★★★	-86			Moderate/ good
185	★★★	-104			
			16	135	Excellent

* Researcher's assessment based on the quality of the stand and on the forest owner's objectives and on the resulting opportunity cost.

CONCLUSIONS

Adaptive consultation is a systematic but flexible approach for decision support. It emphasizes the communicative use of numerical decision-aid methods. Adaptive consultation enables consulting organizations to renew their service schemes and individual consultants to tailor their service in individual cases. Simultaneously, it supports the customers to give feedback and participate actively in the adaptive communication process. The present examples represented stand-, holding- and inter-holding scales of decision making, but in principle they all were anyhow action-level cases. The adaptive consultation includes also the levels of operation and activity, in which the comparable, feedback-based progressive enhancement approach can be applied, e.g. in developing broadly sermon policy tools or in detail preference-rating procedures in forest planning processes.

In small-scale forestry and also in wider natural resources management, the need for versatile decision-aid processes is increasing, due to e.g. climate change issues, demands for transparent

sustainability, and diverse values in society. The examples in this paper are partly imaginary, but they illustrate how adaptive consultation can be applied to respond to the evolving decision-aid challenges. To take adaptive consultation into practical use in small-scale family forestry, open public discussion about the development directions as well as practical experiments and training activities are needed.

It is noteworthy that the presented methods and planning techniques are not new, but instead, their application in this ADA-context is new. For example, the V-value calculation is based on an old theory (Faustmann), but this kind of financially justified decision criterion has not been in common use. Forestry terminology has dominated the practical consultation schemes until these days. For new urban forest owners, however, financial terms might be more understandable.

The aim of this paper was to introduce and describe an approach through which both institutions and practices for forestry consultation could meaningfully be renewed. The overall conclusion emphasizes the role of systematic feedback management and organizational learning in developing owner-driven consultation services for small-scale family forestry.

REFERENCES

- Central Union of Agricultural Producers and Forest Owners (MTK). 2009. Recreational Value Trading - a solution meeting the requirements of landowners and other users. http://www.mtk.fi/MTK_briefly/forestry/en_GB/recreational_value_trading/. Internet site. [Cited March 31st, 2009.]
- Chemero, A. 2003. An Outline of a Theory of Affordances. *Ecological Psychology*, 15(2): 181–195.
- Donner-Amnell, J. 2004. To be or not to be Nordic? How Internationalization has affected the character of the forest industry and forest utilization in the Nordic Countries. In: Lehtinen, A., Donner-Amnell, J. & Sæther, B. (eds.). *Politics of forests: Northern Forest-industrial regimes in the age of globalization*. Ashgate Publishing, pp. 179–204.
- Gibson, J. J. 1979. *The ecological approach to visual perception*. Boston: Houghton Mifflin.
- Hiedanpää, J. 2004. *Making Environmental Policies Reasonable: A Study of the Consequences of Social Diversity for Regional Forest Policy of SW Finland*. Doctoral Thesis, University of Tampere, Finland. *Acta Electronica Universitatis Tamperensis* 376, 66 p. + 5 articles. Available at <http://acta.uta.fi/pdf/951-44-6070-7.pdf>.
- Hokajärvi, R., Hujala, T., Leskinen, L.A. & Tikkanen, J. 2009. Effectiveness of sermon policy instruments: forest management planning practices applying the activity theory approach. Submitted manuscript, 31 p.
- Hujala, T. 2009. *Owner-driven decision support in holding-specific forest planning*. Doctoral Thesis, University of Helsinki, Finland. *Dissertationes Forestales* 85. 40 p. + 4 articles. Available at <http://www.metla.fi/dissertationes/df85.htm>.
- Hujala, T. & Tikkanen, J. 2008. Boosters of and Barriers to Smooth Communication in Family Forest owners' Decision Making. *Scandinavian Journal of Forest Research*, 23:5, 466-477.
- Hujala, T., Pykäläinen, J. & Tikkanen, J. 2007a. Decision making among Finnish non-industrial private forest owners: The role of professional opinion and desire to learn. *Scandinavian Journal of Forest Research*, 22:5, 454-463.
- Hujala, T., Tikkanen, J., Hänninen, H. & Virkkula, O. 2007b. Evaluation of Decision-support Needs among Family Forest Owners in Finland: An Application of Mixed Methods. In: Harrison, S.R., Bosch, A. and Herbohn,

- J.L. (eds.), *Improving the Triple Bottom Line Returns from Small-Scale Forestry, Proceedings from an International Conference, Ormoc, the Philippines, 18–21 June, 2007*, pp. 215–220.
- Hujala, T., Laitila, T., Kurttila, M. & Tikkanen, J. 2009. Multiple motives of family forest owners in their speech about forest-related decision-making. In: Bergseng, E., Delbeck, G. & Hoen, H.F. (eds.). *Proceedings of the Biennial Meeting of the Scandinavian Society of Forest Economics, Lom, Norway, 6-9 April, 2008. Scandinavian Forest Economics 42*, pp. 335–343. Available at http://www.metla.fi/org/ssfe/publications/proceedings_endelig.pdf.
- Jokinen, A. 2004. *Luonnonvarojen käytön ja dynamiikan hallinta yksityismailla [Control of Use and Dynamics of Natural Resources in Private Land Areas]*. Doctoral Thesis, University of Tampere, Finland. *Acta Electronica Universitatis Tamperensis 393*, 60 p. + 5 articles. Available at <http://acta.uta.fi/pdf/951-44-6135-5.pdf>. (In Finnish with English Summary.)
- Kaufman, H. 2006. *The Forest Ranger: A Study in Administrative Behavior*. Resources for the Future, 248 p.
- Kurttila, M., Pykäläinen, J. & Leskinen, P. 2006. Defining the forest landowner's utility loss compensative subsidy level for a biodiversity object. *European Journal of Forest Research 125*(1): 67–78.
- Kurttila, M., Leskinen, P., Pykäläinen, J. & Ruuskanen, T. 2008. Forest owners' decision support in voluntary biodiversity-protection projects. *Silva Fennica 42*(4): 643–658.
- Laurén, K. 2007. Pakko ja vapaus: Metsäluonto työn ja vapaa-ajan kokemuksissa [Compulsion and freedom: Forest nature in labour and leisure experiences]. *Historiallinen Aikakauskirja 105*:2. Available at <http://urn.fi/URN:NBN:fi:ELE-1367720>. (In Finnish.)
- van der Leen, R. & Groot, L. 2006. Post-Productivism and Welfare States: A Comparative Analysis. *British Journal of Political Science 36*(4): 593–618.
- Leskinen, L.A., Laurén, K., Järvinen, S., Sairinen, R. & Leskinen, P. 2008. Sosiaalisten ja kulttuuristen vaikutusten ja kestävyuden arvioiminen metsätaloudessa ja metsien monimuotoisuuden turvaamisessa [Assessment of social and cultural impacts and sustainability in forestry and in the safeguarding of forest biodiversity]. Working Papers of the Finnish Forest Research Institute 99. 24 p. Available at: <http://www.metla.fi/julkaisut/workingpapers/2008/mwp099.htm>. (In Finnish.)
- Leskinen, L.A., Nurminen, H., Kurttila, M. & Leskinen, P. 2009. Metsien suojelun sosiaalisesti kestävä toteuttaminen – Merestä Metsäksi -yhteistoimintaverkostohankkeen tapaus [Socially sustainable implementation of forest conservation – The case of the cooperation network project From Sea To Forest]. *Metsätieteen aikakauskirja 1/2009*: 5–19. (In Finnish.)
- Leskinen, P., Hujala, T., Tikkanen, J., Kainulainen, T., Kangas, A., Kurttila, M., Pykäläinen, J. & Leskinen, L.A. 2009. Adaptive decision analysis in forest management planning. *Forest Science 55*(2): 95–108.
- Metsämonex 2009. <http://www.metsamonex.fi>. Internet site. [Cited on March 26th, 2009.] (In Finnish.)
- Paloniemi, R. & Varho, V. 2009. Changing ecological and cultural states and preferences of nature conservation policy: The case of nature values trade in South-Western Finland. *Journal of Rural Studies 25*(1): 87–97.
- Pregernig, M. 2001. Values of Forestry Professionals and their Implications for the Applicability of Policy Instruments. *Scandinavian Journal of Forest Research 16*: 278–288.
- Pukkala, T. 2002. Measuring non-wood forest outputs in numerical forest planning. In: Pukkala, T. (ed.). *Multi-objective forest planning*. Kluwer Academic Publishers. Dordrecht, pp. 173–207.
- Pykäläinen, J., Kurttila, M. & Pukkala, T. 2006. Interactive forest planning with NIPF owners. In: Nuutinen, T., Kärkkäinen, L. & Kettunen, L. (eds.). *Forest Planning in Private Forests in Finland, Iceland, Norway, Scotland and Sweden. Proceedings of ELAV seminar, 23–24 March 2006, Koli, Finland. Working Papers of the Finnish Forest Research Institute 38*: 61–65.

- Pukkala, T. 2007. Metsäsuunnittelun perusteet [Basics of forest planning]. Gummerus kirjapaino, Jyväskylä. 208 p. (In Finnish.)
- Rannikko, P. 2008. Postproduktivismi metsässä [Postproductivism in the forest]. In: Karjalainen, T.P., Luoma, P. & Reinikainen, K.(eds.). Ympäristösosiologian virrat ja verkostot [Flows and networks of Environmental sociology], pp 83–95. (In Finnish with English abstract.)
- Tikkanen, J., Isokääntä, T., Pykäläinen, J. & Leskinen, P. 2006. Applying cognitive mapping approach to explore the objective-structure of forest owners in a Northern Finnish case area. *Forest Policy and Economics* 9: 139–152.
- Tipple, T.J. & Wellman, J.D. 1991. Herbert Kaufman's Forest Ranger thirty years later: From simplicity and homogeneity to complexity and diversity. *Public Administration Review* 51(5): 421–428.

RECREATIONAL VALUE TRADING (RVT) PROVIDES A NEW SOURCE OF INCOME FOR FOREST OWNERS

Erno Järvinen¹ and Lea Jylhä²

Abstract--Forests offer many products and services to the society around them. Forestry not only produces forest products, but is also a prerequisite for preserving a living forest landscape. At present forest owners are often assumed to provide this opportunity free of charge. The increasing commercial-based nature tourism and economic value related to the landscape require new tools for landscape management in forestry. These tools should reconcile needs of both forest owners and others enjoying and benefiting from the recreational values.

This article describes Recreational Value Trading (RVT) launched by MTK (The Central Union of Farmers and Forest Owners) in Finland. The operating model and its associated model contract could be used by all parties interested in the buying and selling of recreational value. This model also provides an alternative way to obtain income from multifunctional forestry and respond to the diverse needs of society.

According to the RVT proposal, a municipality, recreational area association or even the State would be able to purchase the recreational value of a specified piece of land for a fixed period. For example, forests especially suitable for recreation in the vicinity of densely populated areas could be such areas. The forest owner would commit himself, for an agreed period of time, to manage the selected forest areas so that they would meet the needs of recreation especially well. Areas dedicated to senior citizens' recreation, docking places for boats along waterways, riding parks, etc., located near densely populated areas, could be examples of such areas.

BACKGROUND

Forests and the countryside provide many services

Countryside and forests offer many products and services to the society around them. Open fields and groves, waterways and well-maintained housing stock are all part of the rural landscape. The diverse rural landscape is also an attractive environment for tourism and leisure activities. Agriculture and active farming not only produces food products, but is also a prerequisite for preserving a living rural landscape.

Land and forest owners not only produce raw material for the use of industry but they also maintain nature's biodiversity and other ecosystem services. At the same time, land and forest management offer jobs, and opportunities for recreation and for enjoying nature. Healthy nature

¹ MTK Forestry Group, P.O.Box 510, FI-00101 Helsinki, Finland, tel. +358 20 413 2490, mobile +358 40 351 7978, fax +358 20 413 2403, erno.jarvinen@mtk.fi

² MTK Forestry Group, P.O.Box 510, FI-00101 Helsinki, Finland, tel. +358 20 413 2486, mobile +358 40 848 8081, fax +358 20 413 2403, lea.jylha@mtk.fi

and the diversity of landscapes are all part of the living and lived-in countryside. RVT offers forest owners a new source of income.

The law should protect forest owners' rights

Secure property and land tenure rights are the first steps towards sustainable resource use. The ownership and tenure rights should be defined in and protected by legislation. Protection of property also means that no-one may restrict legal operation or prevent a person from using property she or he owns or controls in a normal way. If seeking to limit the right to private ownership or land usage, legal channels must be employed. Normally there are also varying degrees of limitations and permit requirements for forest management activities as well as a general requirement to give notice of planned felling operations. For instance in Finland, the private ownership of land is protected by the constitution. On the other hand, forest and environmental laws guide forest management and emphasise sustainable management and multi-functionality.

Everyman's right of access offers an opportunity to enjoy nature

Everyman's rights, which are common in Nordic countries, mean that everyone is entitled to enjoy the bounties of nature, including for instance picking of wild berries and wild mushrooms irrespective of whose land they happen to grow on. Land owners should provide this opportunity free of charge. There are two fundamental preconditions for making use of everyman's rights: they need to be occasional or temporary and must not cause nuisance or damage.

Everyman's rights are so-called yielding rights. In other words, one cannot demand that a forest owner should restrict his legal operation in his forests, e.g. felling operations and forest regeneration, for the sake of everyman's rights. Should a forest owner decide to dedicate a particular part of his land to a special use, everyman's rights have to yield. The term "special use" in connection with forested areas can mean, for example, felling and establishing of a new stand by planting. Neither may any commercial activity be practised by virtue of everyman's rights on land belonging to another without the forest owner's consent. Length of the commitment is a significant difference in tropical plantation forestry compared with temperate or boreal forestry plantations. In tropics the value of planted trees may quickly deteriorate for instance due to insect or rot damages. Also, the fast increasing tree dimensions create fast operational limitations therefore making trees less valuable, when the required technology is not present. These problems do not appear in temperate and boreal forestry.

More and more people seek to experience nature

People are all over the world more and more active in outdoor recreation and traversing the natural landscape. Nature tourism is increasing all over the world. Programme-based tourist services and products, such as motorized travel, dog-sled trips and horse trekking are generally forbidden or restricted in protected areas in order to protect the fragile environment. Thus, more and more financial income in nature tourism is being made in commercial forests.

Recreational use being taken into consideration in land use and forest management

The legislation should not contain specific stipulations on the consideration of recreational use of land or forests. Nevertheless the laws should provide the opportunity to manage land or forests in such a way that they are well suited to recreational use. Major parts of tropical forests belong to the states, not to individuals. This only means that governments are encouraged to create

sustainable recreational use of their forests – the principal is still the same, also the government holdings need to yield.

Instructions for the consideration of the landscape and recreational use in land or forest management are also given in the management guidelines and recommendations. The destruction of marked or noticeable pathways, etc, is to be avoided in land or forestry work. Culturally and traditionally valuable sites and landscapes might need special considerations. Overgrown traditional environments will be restored where possible by clearance, after which they are maintained by mowing or grazing.

RECREATIONAL VALUE TRADING (RVT)

Operating model for RVT

RVT is an operating model with which the needs and interests of the forest owner and others enjoying the recreational value of the area can be reconciled. In RVT the forest owner surrenders certain rights relating to the use of his property, undertakes to maintain the land she or he owns so its recreational values (e.g. landscape values) are kept to an agreed standard and accords agreed rights for the recreational use of the land to the purchaser of the recreational value for a predetermined period in return for an agreed recompense. This could be compared with the entry fees of game and other parks in tropical countries. In private forests the hunting permit is one example of the recreational yield contract. One will recognize that many recreational uses of the forests, such as hunting, will not harm at all the forest –based income but is an additional income.

The recompense will be determined according to the market and its amount will be agreed by the forest owner (vendor) and the purchaser of the recreational value. If there are groups of users of a particular type membership, then the contracts for recreational value are negotiated for the groups as fee collection can not be organized easily otherwise.

Either party (vendor or purchaser) may initiate RVT and contact the other party. Actively contacting forest owners is particularly required from persons or parties interested in purchasing recreational value. On a local level, land owners' organisations could be a natural source of information for matters pertaining to RVT and through these the potential buyer will have an opportunity to contact the forest owner. Land owners' organisations could also assist the forest owner in matters relating to securing the trade, such as assessing the factors relating to the recreational value.

Parties to the Contract

The vendor of the recreational value is always the forest owner/holder of the right to use. The purchaser may be a private individual (e.g. neighbour), village association, recreational area association, outdoor activity or sport association, municipality, foundation, business/entrepreneur or tourism centre interested in the recreational and landscape values of the area. The contract needs to be made in a written form.

Defining the object of the trade

The object of the trade (the recreational value) will be defined as concretely as possible during the drawing up of the contract. The contract will always be centred on an area of land delineated

on a map or marked on the terrain. Defining the size and shape of the area is a matter between the parties to the contract, and may be differ greatly depending on the object of the trade.

For example, the trade may concern

- delaying the final felling of a forest stand for an agreed number of years
- maintaining a certain species or mixed forest in a particular area of a forest
- keeping a certain area open or, for example, as a meadow
- maintaining the view from a hill to a waterway
- maintaining the forest around a hiking or horse-riding route
- establishing beaching and fire-lighting places and maintaining their immediate environment

The measures and scope of the tasks and management activities will be defined as unambiguously as possible in the contract.

The RVT contract does not confer any ownership or tenant's rights on the area which is the subject of the contract or on its soil or flora including trees. The land use type of the area which is the subject of the contract will not change. Generally the contract will not limit any other possibility to hike or enjoy nature in the area. Nevertheless the freedom to roam will be yielded when an area is put to special use; e.g. when the forest owner and a nature tourism entrepreneur agree a RVT on a smallish island, in which case the entrepreneur who has paid the recompense shall have the first right to use the area.

Determining the duration of the contract and price

The contract is always for a fixed term. The vendor and purchaser will determine the period of the contract's validity according to each case.

RVT is a market activity; therefore the price will be formulated within the market. There is no general pricing system for RVT; rather the price will be formulated in the discussions between the parties. In addition to possible loss of income to the vendor, the additional value of the object of the trade will be assessed in the RVT.

Factors influencing the determination of the price include, the length of the contract's validity, the nature of the area's use, measures to be undertaken, the landscape, optional costs to the land owner, the location of the area and its proximity to other similar areas and the risk of destruction to the area's trees (e.g. root-rot fungus).

The following estimates/calculations can be used for determining the price:

- loss or gain of income to the forest owner
- losses or gains due to the reduction in the value of the area or to its trees
- possible labour and materials costs

- recreational value benefits to the purchaser
- additional value derived from the area's specific recreational value.

It is essential to emphasize the balance; The forest owner equally has a possibility to gain and therefore the trade negotiations is the only measure of the level of combination – that is the competing service providers and the buyers willingness to pay. Also, the contract must specify the existence of customary rights and that the contract specifies services in excess of them.

Validity of the contract in relation to transfer of ownership

If ownership of the object of the RVT changes in exchange for payment, then the contract is not binding for the new owner. The RVT contract may contain a condition, according to which, in connection with a condition in the deed of ownership transfer, the new owner will undertake to fulfil the duties of the RVT contract for the remainder of its validity.

If ownership is transferred by other means than in exchange for payment (inheritance, legacy, gift, division) then the recipient party will be bound by the contract unless otherwise determined by law. In these cases the forest owner shall include it as a term of the title deed that the new owner is bound by the contract.

Dissolution and disputes of the contract

The contract may be dissolved if the recreational values of the object of the contract have changed in such a way (e.g. as a result of storm- or other natural occurring damage) that there are no longer grounds for the validity of the contract. If the contract is dissolved on these grounds, the forest owner will return the amount relating to the remaining share of the price paid to the purchaser.

The forest owner may resign immediately from the contract, if the purchaser neglects to pay the agreed sum or breaks other conditions of the contract. Recompenses already paid will not be returned to the purchaser.

The purchaser of the recreational value may resign immediately from the contract if the owner of the object of the contract has, through his operations, knowingly reduced or destroyed the recreational value of the area or has broken other conditions of the contract. The forest owner will repay the price determined by the contract in full. In accordance with the contract, possible cases of dispute will be heard in the lower court holding jurisdiction over the location of the land in question.

THE ROLE OF THE FOREST OWNERS' ORGANISATIONS

On a local level, forest owners' organisations are a natural source of information and assistance for those forest owners interested in RVT. They will pass information from the prospective purchaser to the forest owner, so she or he may contact the purchaser. They will not, however, give out the forest owner's private details or other information to the purchaser.

These forest owners' organisations will also assist the forest owner in matters relating to securing the trade and assessing the factors relating to determining the price. The help service provided by associations is subject to a fee.

In meetings between the forest owner and the association's advisor, the situation as well as the forest owner's possible objectives for the area of the RVT will be set out. The advisor of land owners' organisations will investigate the objectives of the RVT, the usage type of the area and possible tasks to be carried out in the forest. At the forest owner's request she or he will also pay a field visit to the site in question. After determining the delineation of the area the advisor will estimate the potential loss of income and costs to the forest owner as well as other factors affecting the RVT. The forest owner will assess his interests in the RVT and make a decision on the tender price using e.g. the estimates of costs from the forestry association.

BACKYARD WOODLOTS: FILLING THE SMALL ACREAGE SERVICE PROVIDER GAP WITH THE GREEN INDUSTRY

Jonathan Kays¹, Adam K. Downing², and James Finley³

ABSTRACT--To better understand the needs of small-acreage landowners and the readiness and interest of the green industry (landscapers and arborists) to be potential providers to service these needs, companion surveys were conducted with each audience in 2007 and 2008. The landowner survey sought to acquire data on basic demographics, impact of educational programs, which woodland management activities landowners presently carry out, and their willingness to pay for services. The companion survey of potential service providers in the green industry provided data on basic demographics, interest in training in small woodlot management, and what woodland management practices they presently offer to clientele. The findings have been used to design and deliver educational programs targeting landowners, natural resource professionals, and the green industry. The lack of management on small acreage woodlots is a growing concern as in sum they provide ecological and social ecosystem services that broadly benefit the society. A “chicken and egg” situation of simultaneously educating landowners and equipping service providers demands a comprehensive approach. In this paper, we present the results of surveys, as well as lessons learned in educational program design, delivery, and evaluation. We offer suggestions on the types of program approaches that appear most promising at affecting change. This presentation compliments *Backyard Woodlots: Large Scale Education for Small Scale Acreages* submitted by A. Downing.

INTRODUCTION

Private woodland owners holding less than 10 acres own 61 percent of the forest properties in the United States. In the Mid-Atlantic region this varies from about 60 percent in Pennsylvania and Virginia to about 84 percent in the highly parcelized states of Maryland and New Jersey (Butler, 2006). The actual percentage of woodland acreage held by those owning one to nine acres is relatively small in Pennsylvania and Virginia (about 8 percent). However, in the more heavily parcelized states of Maryland and New Jersey, the private ownerships one to nine acres in size represent 22 percent and 32 percent of the total private forest acreage, respectively.

The number of properties held by these individuals should attract the attention of natural resource related businesses. As parcelization creates more and more small acreage properties, the demand for land management providers can only increase. Private consulting foresters and loggers have been slow to recognize and respond to this new business opportunity where timber

¹ University of Maryland Cooperative Extension, Keedysville, MD 21756, USA, 301-432-2767, jkays@umd.edu

² Virginia Cooperative Extension, Northern District, Madison, VA 22727, USA, 540-948-6881, adowning@vt.edu

³ The Pennsylvania State University, School of Forest Resources, University Park, PA 16802, USA, 814-863-0402, fj4@psu.edu

is not a major focus. Existing green industry businesses such as arborists and landscape contractors could benefit from engaging and training a cadre of natural resource service providers equipped and already willing to connect with small acreage clientele.

A companion paper presented at this conference entitled, *Backyard Woodlots: Large Scale Education for Small Acreages*, provides details on an educational program focused on the small acreage owners (Downing, Kays & Finley) . The outreach program uses a self-assessment manual entitled, *The Woods in Your Backyard: Enhancing Natural Areas Around Your Home* (WIYB), as part of an educational workshop to help small acreage owners learn how to make informed decisions that reduce their impact on water, wildlife populations, recreational opportunities, and forest health (Kays *et al.* 2006).

The first part of this paper provides details on the impacts of landowner training efforts and the willingness of landowners to pay for specific land management services in the State of Maryland. In the second part, it also provides findings from a companion survey conducted with green industry professional from the Washington, D.C/ Baltimore Metro area who had attended a presentation on *The Woods in Your Backyard* to help them recognize the opportunity to develop services for “backyard” woodlots. The survey provided insights on their perceptions of their potential new clientele, the woodland services they now offer, and their interest in additional educational programs.

UNDERSTANDING SMALL ACREAGE LANDOWNERS

Since the release of the WIYB manual, over 2651 small acreage owners, many of whom are volunteer master gardeners, and forestry volunteers, have attended either a single presentation or two-evening workshops in Pennsylvania, Virginia, and Maryland. Approximately 1300 Maryland participants have attended workshops and completed follow-up evaluations and exit surveys. These evaluations have helped identify the needs, interests, and actions taken by attendees.

Methods

In Fall 2007, a six-month follow-up survey was sent to 316 participants of one of sixteen *The Woods in Your Backyard* training sessions in Maryland held between September of 2006 and May 2007 (Kays & Green, 2008). The one- or two-hour workshops highlighted challenges faced by small-acreage owners, and demonstrated how *The Backyard* manual could be used as a learning tool to indentify and reach personal objectives. The survey response rate was 35 percent. Only 60 of the respondents owned 1-10 acres, so the analysis was restricted to this response set.

Results and Discussion

The respondents were primarily private landowners (83%). Beyond holding land, the respondents had additional interests in the program as 59 percent were master gardeners, 9 percent were forestry volunteers, and 8 percent were natural resource professionals. One-half of the participants were over 60 years old and one-third was 50-59 years old.

Respondents provided the following information about their properties. The term natural area refers to self-sustaining areas with native vegetation, water or natural features such as forests, old fields, wetlands, etc:

- 35 percent had less than 25 percent of their land in natural area
- 47 percent had 26-75 percent in natural area
- 18 percent had over 75 percent in natural area

Other key points from the survey include:

- 48 percent would like to convert lawn to natural area. Of these, 33 percent would like to convert up to 25 percent more lawn to natural area.
- 13 percent had enrolled in property tax reduction program
- 40 percent had assessed wildlife habitat, identified their interests, and developed a property map.
- 23 percent had contacted a service provider for assistance in implementing a practice and additional 7 percent planned to make such a contact, mostly with green industry professionals.
- 49 percent had shared information from the workshop or publication with others and 52 percent had initiated a discussion with friends or family about lawn conversion.
- 40 to 50 percent had completed workbook activities that assessed wildlife habitat, identified their interests in the land, and developed a map of the property.
- 35 to 76% had completed 8 of the 14 woodland management activities included in the survey and 39 percent wanted more in-depth information.

The manual along with the educational program suggest many woodland management activities that landowners might include in a plan for their property. A central interest in the survey was to understand landowner willingness to use specific activities and their interest in investing in services to complete these projects (Table 1).

Table 1. Woodland Activities of Private Landowners and Willingness to Pay.

Woodland Activity	Service Category	Percent Done Activity	Percent Willing to Pay for Service
Controlling vines in natural areas so they do not damage trees.	Forest Health	82	0
Building wildlife brush piles.	Wildlife	77	2
Felling hazard trees	Forest Health	63	8
Designing, creating or enhancing a trail through a natural area	Recreation	55	5
Planting trees or shrubs along a drainage to improve water quality	Water Quality	45	7
Herbiciding invasive and exotic plant species in natural areas	Forest Health	42	7
Cutting trees for firewood	Forest Products	42	5
Preparing and planting existing lawn area with tree seedlings	Forest Establishment	37	10

(less than 3' tall)			
Creating a tall grass meadow using less mowing or burning	Wildlife	32	8
Planning and establishing wildflower meadows	Wildlife	25	5
Preparing and planting wildlife food plots using corn, sorghum, clover, etc.	Wildlife	17	5
Cutting a few logs to mill for lumber	Forest Products	10	17
Cutting a few trees for income	Forest Products	2	12
Growing non-traditional crops such as shiitake mushrooms or ginseng	Forest Products	3	5

It is clear that respondents are willing to undertake activities that enhance and improve existing natural areas on their properties. Among most popular activities were: controlling vines, building brush piles, felling hazard trees, and creating or improving a trail. There is less likelihood they will have taken steps to convert lawn to tree cover; however, the responses suggest there is interest in finding others to help with this type of work. Activities that require special skills or specialized equipment, such as harvesting of trees for products other than firewood, are not commonly accomplished; however, respondents indicated an interest in having others perform these services on their land. Interestingly, respondents expressed little interest in non-timber forest products (Table 1).

The low level of activity related to forest products is consistent with the demographics of small acreage owners who are more interested in amenities, wildlife, and other non-consumptive objectives. The lack of knowledge about timber harvesting and non-traditional crops as well as the lack of foresters and loggers who can profitably work on small acreage properties likely contributes to the low activity in this area.

The survey did not explicitly ask if the respondent had done a given activity themselves or hired someone to have it done. However, we speculate that in most cases they had done the activity themselves. We also do not know the magnitude of any activities selected. It may be that cutting one vine means controlling vines, or cutting one tree for firewood is selective cutting.

Willingness to Pay for Services

We were particularly interested in the willingness of clientele to pay for services (Table 1). In general, there was little willingness to pay for most activities. As noted above, there is more willingness to pay for activities that require a chainsaw or specialized equipment and training (e.g., felling hazard trees, preparing and planting a lawn using tree seedlings, creating a meadow using mowing or burning, or cutting logs for lumber or income).

These landowners are very involved with their property and carry out a range of woodland activities. While many have contacted service providers for assistance, their interest in paying for services is low. If educational programs such as *The Backyard* manual help landowners learn

about their properties, it is possible that they will appreciate the benefits of certain management activities and be more willing to pay for services. It is encouraging that 10 percent of the respondents indicated a willingness to pay for preparing and planting an existing lawn area with tree seedlings and using tree shelters to establish a new forest area. This is a potential opportunity for green industry professionals and tree planting contractors.

Impact of More Intensive Landowner Education

The *Woods in Your Backyard* manual was designed to be used either as a “self-learning” tool or as a curriculum guide in workshops. In 2008, 61 Maryland landowners participated in two separate workshops. Each workshop included two evening sessions with one week between sessions. A combined pre- and post-workshop evaluation completed at the end of the second workshop scaled knowledge change for six topics covered in the workshop series. The scale ranged from 1 = not knowledgeable, to 10 = very knowledgeable. Participants assessed their knowledge at an average of 3.6 prior to the workshop, and at an average of 7.8 after completing the second workshop. Forty three participants (70%) planned to convert excessive lawn to natural area, and 85 percent planned to better manage existing natural areas. Over half of the respondents planned to complete the manual activities and 85 percent will use the internet to find maps of their property and other information.

The common extension model links knowledge gain to adoption (Rodgers 2003). As landowners learn more about their properties and benefits of certain practices, they appear motivated to implement a variety of woodland activities. Future workshop evaluations and follow-up surveys should assess willingness to pay for services. We believe landowners who complete the two-evening workshop series will be more likely to seek the services of professionals who can implement their plans.

THE INTEREST OF GREEN INDUSTRY PROFESSIONALS AS SERVICE PROVIDERS

Methods

In 2007 and 2008, a companion survey designed to complement the one used for small acreage landowner, was conducted of potential service providers from the green industry (landscapers and arborists) to better understand their readiness and interest in providing small acreage woodland services. The survey asked potential service providers about woodland management services they presently provide, their interest in training related to small woodlot management, and basic demographic data. The green industry survey used the same list of woodland activities as were included in the landowner survey. This approach permitted comparisons among activities and willingness to pay by landowners for the type of services that the green industry professionals offer.

Rather than conduct a mail survey with professionals, presentations were given at the Mid-Atlantic International Society of Arboriculture, Chesapeake Conservation Landscaping Council, and the Pest Management for Landscape and Nursery Managers and Arborists meeting in Fall 2008. The survey was provided to those attending the presentations and collected before they left the presentation hall. Fifty participants completed the survey.

Survey Results and Discussion

Of the 50 professionals who returned the survey, 34 % were landscape architects, 26 % landscape contractors, 26 % tree service or arborists, and 14 % lawn mowers. Three of four respondents were from Maryland. Most had been in business for more than 10 years, and 25 percent had 10 employees. The respondents shared that 36 % of their clients had 1-5 acres, and 12 % had 6-10 acres (52% did not respond). It was encouraging that nearly half (46%) of the respondents were interested in additional educational programs on Backyard Woodlots, and 68 % asked to receive mailings about upcoming programs.

The specific services offered by green industry professionals ranged from a high of 62 % for planting trees along drainage areas, to a low of 6 % for growing non-traditional crops (Table 2).

Table 2. Services Provided by Green Industry Professionals

Service Provided	Service Category	Percent offering service
Planting trees or shrubs along a drainage to improve water quality	Water Quality	62
Planning and establishing wildflower meadows	Wildlife	56
Designing, creating or enhancing a trail through a natural area	Recreation	52
Controlling vines in natural areas so they do not damage trees	Forest Health	52
Herbiciding invasive and exotic plant species in natural areas	Forest Health	46
Creating a tall grass meadow using less mowing or burning	Wildlife	42
Preparing and planting existing lawn area with tree seedlings (less than 3' tall)	Forest Establishment	40
Felling hazard trees	Forest Health	40
Building wildlife brush piles	Wildlife	34
Cutting a few logs to mill for lumber	Forest Products	18
Cutting trees for firewood	Forest Products	18
Preparing and planting wildlife food plots using corn, sorghum, clover, etc.	Wildlife	16
Cutting a few trees for income	Resource	14
Growing non-traditional crops such as shiitake mushrooms or ginseng	Resource	6

The top nine activities offered by the green industry professionals involve either specialized equipment or skills (see activities 1 to 9 in Table 2). Actually processing trees into products (i.e., lumber and firewood) is not as popular as activities involving changing land use or manipulating vegetation. Most landowners enjoy wildlife related activities and many people feed birds and other species. Surprisingly, service providers are not currently doing much to provide food resources for wildlife or enhance wildlife habitat. The continuing problem with overabundant deer in the region may be one reason that wildlife habitat improvement, which will usually benefit deer as well as other species, is not highlighted. Most of the services provided relate to water quality, recreation, and forest health and establishment.

This survey of service providers cannot be generalized to the overall green industry, given the select sample of green industry professionals. However, it indicates that green industry professionals offer woodland services and they are receptive to future educational programming to further develop their services. The challenge is to identify receptive businesses and to find the right venue for educational programs.

The survey of landowners found that only a small percentage of landowners are willing to pay for woodland services (Table 1). If educational programs such as *The Woods in Your Backyard* can help landowners learn about their properties and about the benefits of implementing woodland practices beyond what they can do themselves, it is possible that there are potential profit centers for new businesses that offer woodland services.

Service Provider Activity by Profession

The survey data provided information on services offered by profession. The respondents who identified their services as primarily lawn mowing offered a small percentage (about 13% on average) of the services in Table 2. Table 3 provides a comparison of services provided by landscape-related professionals (landscape contractors and architects/designers) and arborists (arborists and tree services). In general, landscape-related professionals offer unique services that involve forest establishment, water quality protection, wildflower meadows, and recreational trail construction. These are the services offered by the largest number of respondents in Table 2.

By contrast, arborist professionals offer unique services that involve felling of hazard trees, and cutting trees for lumber, income, or firewood – services offered by a very low percentage of the overall survey respondents (Table 2). Particularly interesting were the forest health and wildlife management services offered by both sectors of the industry, and the dominance in that by landscape-related professionals. These crossover service areas represent educational opportunities that would be attractive to both sectors of the industry.

The differences in services unique to each profession make sense as arborists tend to focus on chainsaw-related activities, and landscape-related professionals focus on the design and installation of land management activities. These insights suggest the need for specific educational programs for different green industry professionals and the potential for partnering with foresters and loggers.

Table 3. Percentage of Green Industry Professionals Offering Woodland Services by Category

Service Category & Services	Landscape Contractors & Architects/Designers	Arborists/ Tree Service
<u>Forest Establishment/Water Quality</u> Planting trees or shrubs along drainage ways, preparing, planting lawns with tree seedlings	69%	17%
<u>Wildlife Management & Recreation</u> Establishing wildflower meadows, designing or creating trails	68%	19%
<u>Forest Health</u> Controlling vines in natural areas, spraying exotic and invasive species	57%	27%
<u>Wildlife Management</u> Building brush piles, establishing wildlife food plots, creating tall grass meadow with less frequent mowing or burning	65%	30%
Forest Health Felling hazard trees in woodlands	28%	57%
Forest Products Cutting trees for lumber, firewood, or for income	15%	77%

Lessons Learned from Green Industry Education Programs

Based on survey results and discussions with green industry professionals, educational programs were developed specifically to target the green industry. In November 2008, a full-day program entitled *Landscapes and Backyard Woodlots: Business Opportunities for the Green Industry* was offered. The goal was to provide green industry professionals (i.e. landscapers and arborists) with tools and knowledge to expand their traditional business model to serve an evolving market managing and creating backyard woodlots (Kays and Downing, 2008). Although the workshop was widely advertised, response was low (23 participants); however, several attendees are now seeking opportunities in this new market area. Landscapers represented the majority of those attending, a further indication of the greater interest of these professionals as service providers.

The day-long program focused on teaching knowledge and skills. Fortunately, participants and presenters shared ideas and perspectives, resulting in shared benefits. Lessons learned included:

- While the landscaper and arborist survey indicated that this industry offered a variety of woodland services (Table 2 and 3), many workshop participants realize they are not well qualified to make management recommendations to landowners. To address this, they see a benefit in developing working relationships with a professional forester willing to meet clients and to make recommendations, which the green industry would then implement.

Traditionally professional consulting foresters work on a commission-basis deriving income from timber harvests. In the green industry, they would more likely be paid a fee.

- The low turnout for the *Landscapes & Backyard Woodlots program* may have been partially related to the concerns about uncertain demand and potential profitability in the current economic downturn. Many businesses are struggling and cautious about providing new services with questionable profitability, especially when they may require additional skills and investments. Future training programs for this audience must demonstrate proven profitability in given service areas. This could be addressed by including examples from successful businesses providing these services. Landscape-related businesses would be a logical audience to target initially.
- Arborists are reluctant to offer logging type activities on small acreage woodlots because of the differences in Occupational Safety and Health Administration (OSHA) regulations and insurance requirements between logging and their industry standards. Discussions with arborists at subsequent professional meetings find they do not want to be seen as loggers. Nonetheless, arborists express strong interest in learning to buck and grade logs from trees removed from residential or commercial properties. As a result, programs are being planned with arborist professional associations in Maryland to teach arborists about tree value, bucking trees for maximum value, and cooperating with local sawmills to receive fair prices. These programs will encourage cooperation to attain better market sawlogs which are normally cut for firewood.

Some arborists, when there is sufficient volume, have tried to arrange for loggers to pick up logs from residential properties. However, in many cases the logger failed to follow through, leaving the arborist with an upset client and an unsightly log pile they had to remove from the site. This suggests there is an opportunity to identify loggers interested in working with arborists on small-acreage properties, and to provide education on how to work with clientele in this niche market.

CONCLUSIONS

The focus of this study and the educational programs has been the Mid-Atlantic region; however, the challenge of encouraging management on small acreage parcels is a nationwide issue. Parcelization and fragmentation of the landscape has been documented (Butler 2006) and the challenge of providing technical and educational assistance to private landowners with small acreage tracts a reoccurring national theme (A Closer Look at Forests on The Edge 2008). There are likely regional differences, but the results of this paper should apply to regions with a high percentage of the private forest ownerships under 10-20 acres.

The need for, willingness, and readiness of landscapers and arborists to provide woodland services is a “chicken and egg” issue. Addressing it will require both educating landowners about the management of their small-acreage holdings to more effectively meet their needs, and equipping service providers to provide a comprehensive approach. In part, this approach will involve networking interested foresters and loggers to work with new clientele and green industry professionals.

The results from the surveys described in this paper provide insights into lessons learned and some generalizations about the needs of stakeholders for developing new business opportunities. There is clearly a need for the following:

- Target programs to arborists that focus on improved profitability from bucking, grading and marketing of logs to local sawmills and/or through the development of cooperatives that would increase market opportunities.
- Landscape-related professional will likely need to provide woodland services such as establishing small tree plantings, establishing wildflower meadows, and creating recreational trails. They would also be the primary provider of services such as controlling invasive and exotic species, building brush piles, creating tall grass meadows, and wildlife food plots, although some arborist professionals would also be interested in these services (Table 3). To build this opportunity, it will be useful to develop case examples of businesses that demonstrate success. Education programs should seek to improve skills and knowledge related to designing and implementing practices on small acreage landholdings which are not intensely managed.
- Foresters and loggers interested in working on small acreage properties need to be identified. This might be accomplished using surveys or through workshops at professional meetings. Here again, there will be opportunities to develop educational programs that link knowledge and skill sets of different professionals to new audiences and clientele.

REFERENCES

- Butler, B. 2006. Family Forest Owners of the United States 2006. General Technical Report NRS-27. USDA Forest Service, Northeastern Forest Experiment Station,
- Kays, J., J. Drohan, A. Downing, & J. Finley. 2006. The Woods in Your Backyard: Learning to Create and Enhance Natural Areas Around Your Home. Ithaca, NY; Natural Resource, Agriculture, and Engineering Service. 138 pg.
- Kays, J. & A. Downing. 2008. Are There Business Opportunities for the Green Industry in Backyard Woodlots? Groundwork. MD/VA/DC Landscape Contractors Association, September 2008. Pg 7-12.
- Kays, J. & E. Green. 2008. Survey Results for 2007: Maryland Woods in Your Backyard Workshops. Project Report. Keedysville, MD: University of Maryland Cooperative Extension.
- Kays, J. & E. Green. 2008. Survey Results for 2007: Potential Providers of Woodland Management Services for Small Acreage Woodland Owners. Project Report. Keedysville, MD: University of Maryland Cooperative Extension.
- Rogers, E. M. (2003). Diffusion of innovations (5th ed.). New York: Free Press
- White, E. & M. Rhonda. 2008. A Closer Look At Forests On The Edge: Future Development on Private Forests In Three States. Gen. Tech. Rep. PNW-GTR-758. Portland, OR: USDA Forest Service.

FOREST LANDOWNERS' PREFERENCES FOR FORESTRY EXTENSION SERVICES IN NORTH CAROLINA

Terhi Koskela¹, Dennis Hazel², Robert Bardon³ and Mark Megalos⁴

Abstract--The sustainability of forests relies on millions of non-industrial private forest landowners who make the decisions that affect the management of the land. The purpose of the study is to examine landowners' perceptions on the importance of different topics about which Extension Forestry currently offers information and education; and to describe landowners preferred distribution channels for information and educational material. The data were collected by a mail survey sent to 2600 non-industrial private forest landowners in 13 North Carolina counties in 2005.

Three priority groups were identified among landowners regarding the importance of different forestry extension topics. Timber producers (56%) emphasized the topics related to economic utilization of the forest. Landowners in the group Environmentally-oriented (one fifth), stressed only non-timber attributes. The third group, Producers of other goods than timber (one fourth), was interested in the topics related to alternative uses of forest.

Most landowners considered mailed material as an appropriate information delivery method. Also short educational programs were accepted by more than half of the respondents. Four distinct groups could be identified: passive landowners were not interested in any form of information; traditionalists preferred to receive all information by mail; users of modern methods preferred to use internet-based services and long-distance education; and the fourth group strongly emphasized participatory methods. The results show that there is a need to offer a wide range of forestry extension services and education that suit to the varying conditions and objectives of individual landowners.

INTRODUCTION

The nation's forests provide economic, social, and environmental benefits that benefit all of society. The sustainability of these forests relies on millions of non-industrial private forest landowners (NIPF). Sustaining these forests will require reaching these landowners who make decision that affect the forests (Jones *et al.* 2001).

The traditional means of reaching and educating these landowners in North Carolina have been through the Cooperative Extension Service (CES) (Barden *et al.* 1996). Nationally, only 14% of

¹ Finnish Forest Research Institute, P.O. Box 18 (Jokiniemenkuja 1), FI-01301 Vantaa, Finland, Phone: +358 40 801 5146, Fax: +358 10 211 2202, Email: terhi.koskela@metla.fi

² dennis_hazel@ncsu.edu

³ robert_bardon@ncsu.edu

⁴ mark.megalos@ncsu.edu

^{2,3,4} North Carolina State University, Campus Box 8008, 4231 Jordan Hall, Raleigh, NC 27695-8008

family forest owners have sought advice from a multitude of public and private sources that include state forestry agencies, Extension, federal agencies, private forestry consultants, forest industry, loggers, and other landowners (Butler 2006). In North Carolina the three major sources of advice are the state forestry agency, private forestry consultants, and Extension. Landowners whom seek education are often motivated to adopt a more active role in managing their forest (Baughman 1994) and are more likely to utilize government programs that enable adoption of practices (USDA 2005).

It is suggested to use diverse information delivery methods to reach the landowners, but the delivery methods must be matched with target audiences to insure their efficacy (Egan *et al.* 1992, Rodewald 2001, Londo & Gaddis 2003, Radhakrishna *et al.* 2003, Cartmell II *et al.* 2006). Not only the information delivery method should be suitable but also the subjects should fit landowners' needs. Forest ownership objectives have become an increasingly important issue in many countries and have attracted considerable research and investigation over the last decades (e.g. Hänninen & Karppinen 1996, Kangas & Niemeläinen 1996, Karppinen 1998, Karppinen & Hänninen 2000, Selby *et al.* 2007).

Dynamic forestland ownership patterns and increased demands for forest products and other benefits together emphasize the need to deliver relevant forestry information to a growing and changing NIPF population. The purpose of the study is to examine landowners' perceptions on the importance of different topics about which Extension Forestry currently offers information and education; and to describe landowners preferred distribution channels for information and educational material.

METHODS

The data were collected by a mail survey sent to 2600 non-industrial private forest landowners from 13 counties of North Carolina in 2005. The response rate in the mail inquiry was 15 %. The 13 counties, selected using a stratified random sample, were chosen from a population of 100 counties distributed between seven Cooperative Extension districts. A stratified random sampling of the counties was done to ensure that all regions of the state were represented (Figure 1). Within each county, 200 landowners were randomly selected from the 2004 present use-value tax records.

The questionnaire included questions concerning the importance of different forest related subjects of which the Extension Forestry offers information; and questions concerning the preferences for information delivery methods. The original variables were condensed by principal component analysis into a few interpretable components. The principal component scores were used as criterion variables for K-means clustering. K-means clustering attempts to identify relatively homogeneous groups of cases based on selected characteristics. Owner and holding characteristics were described by sample means and crosstabulations. Forest management experience, future plans for forest management, sources from which forestry information is obtained, and required forest-based income were also examined. Analyses were conducted by using SPSS.

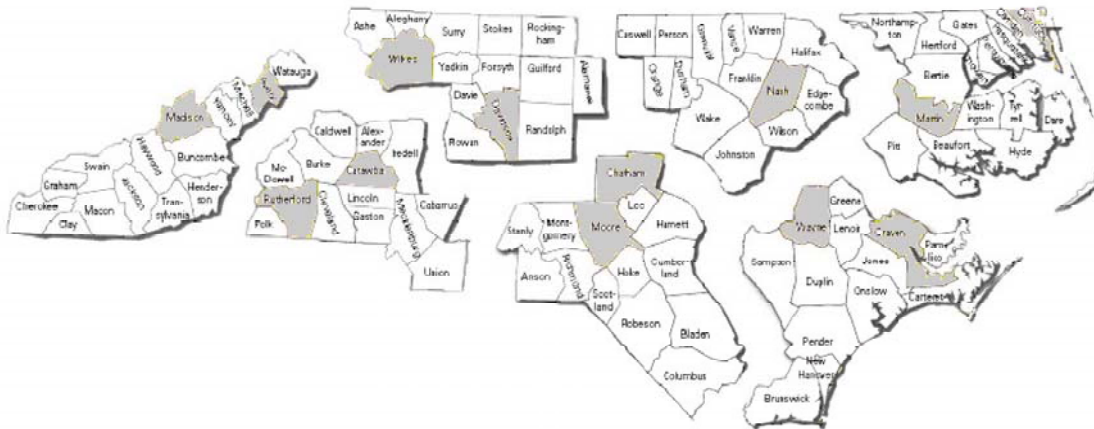


Figure 1. Distribution of 13 North Carolina Counties (shaded counties) selected through stratified random sampling across seven cooperative Extension districts.

RESULTS

Landowners were asked to rate the importance of different subjects about which Extension Forestry currently offers information and education, on a five point scale from 'very important' to 'not at all important'. Overall, issues concerning forest management, forest productivity and forestry activities were considered more important than factors related to recreation, landscaping or conservation easements. Landowners were divided into three groups by cluster analysis: Timber producers (56%) emphasized the topics related to economic utilization of the forest. In the group *Environmentally-oriented* (one fifth), only the non-timber attributes received positive loading. Third group, Producers of other goods than timber (one fourth), emphasized the possibility to receive profit from alternative uses of forest.

Landowners' preferences for information delivery methods were examined by asking the respondents to assess how appropriate different delivery methods are on a four point scale from "Would never use" to "Would often use". The six information delivery methods included mail-based material, web-based material, short programs, long programs, landowner association participation, and distance education. Most of landowners considered mailed material as appropriate information delivery method. Also short educational programs were accepted by more than half of the respondents. By K-means clustering four distinct groups were identified. Passive landowners (10%) were not interested in any form of information delivery methods presented in the questionnaire. Traditionalists (30%) preferred to receive all the information by mail - especially the modern information delivery methods were undesired in this group. Users of modern methods (one fourth) preferred to use internet-based services and long-distance education. Users of participatory methods (one third) supported all kind of information delivery methods but strongly emphasized the participatory ones.

CONCLUSIONS

Extension Forestry assists landowners to reach the economic, social and environmental goals they hold for their forests. Therefore it's crucial to recognize landowners' needs for information and services as well as to deliver the information by using method that the landowners are able to utilize. The results clearly support a need for developing flexible forestry extension services that suit to the varying conditions and objectives of individual landowners. Forestry extension efforts

can be more efficiently targeted by identifying the different preference groups and preferred information delivery methods among landowners.

REFERENCES

- Barden, C.J., Jones, S.B., & Biles, L.E. 1996. Extension forestry education: Reaching the people who make decisions. *Journal of Forestry*, 94(3), 31-35.
- Baughman, M.J. 1994. Workshops I and II Results. In *Proceedings: First national conference on forest stewardship*, p. 98. St Paul: University of Minnesota, Minnesota Extension Service.
- Butler, B.J. 2008. *Family Forest Owners of the United States, 2006*. Gen. Tech. Rep. NRS-27. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 72 p.
- Cartmell II, D.D., Orr, C.L., & Kelemen, D.B. 2006. Effectively disseminating information to limited-scale landowners in the urban/rural interface. *Journal of Extension* [On Line], 44(1) Article 1FEA5. Available at <http://www.joe.org/joe/2006february/a5.shtml>.
- Egan, M.W., Welch, M., Page, B., & Sebastian, J. 1992. Learners' perceptions of instructional delivery systems: Conventional and television. *The American Journal of Distance Education*, 6(2), 47-55.
- Hänninen, H. & Karppinen, H. 1996. Kansalaismielipide metsien suojelusta ja talouskäytöstä. *Folia Forestalia - Metsätieteen aikakauskirja* 1996(1): 27-39.
- Jones, S.B., Glover, G.R., Finley, J.C., Jacobson, M.G., & Reed, A.S. 2001. Empowering private forest landowners: Lessons from Pennsylvania, Alabama, and Oregon. *Journal of Forestry*, 99(3), 4-7.
- Kangas, J. & Niemeläinen, P. 1996. Opinion of Forest Owners and the Public on Forests and Their Use in Finland. *Scandinavian Journal of Forest Research* 11(3): 269-280.
- Karppinen, H. 1998. Values and objectives of non-industrial private forest owners in Finland. *Silva Fennica* 32(1): 43-59.
- & Hänninen, H. 2000. Forest conservation and economic utilization: Public attitudes in Finland. *Journal of Forest Economics* 6(1): 55-79.
- Londo, A.J., & Gaddis, D.A. 2003. Evaluating Mississippi non-industrial private forest landowners acceptance of an interactive video short course. *Journal of Extension* [On Line], 41(5). Available at <http://www.joe.org/joe/2003october/rb4.shtml>.
- Radhakrishna, R.B., Nelson, L., Franklin, R., & Kessler, G. 2003. Information sources and extension delivery methods used by private longleaf pine landowners. *Journal of Extension* [On Line], 41(4). Available at <http://www.joe.org/joe/2003august/rb3.shtml>.
- Rodewald, A.D. 2001. Delivery systems – Is the “latest” technology the greatest? *Journal of Extension* [On Line], 39(4). Available at <http://joe.org/joe/2001august/tt2.html>.
- Selby, A., Koskela, T. & Petäjistö, L. 2007. Evidence of lay and professional forest-based development discourses in three contrasting regions of Finland. *Forest Policy and Economics* 9: 633-646.
- US Department of Agriculture (USDA) Cooperative State Research, Education and Extension Service. (2005). *Sustaining the Nation's forest and rangeland resources for future generations: FY 2005-2009 RREA strategic plan*. Available at http://rreaprograms.info/Planning/Denver/Plan/plan_final

SMALL SCALE FOREST OWNERS' RESPONSIBILITY – ECONOMIC, SOCIETAL, AND ENVIRONMENTAL

Lars Lönnstedt¹

Abstract--The paper analyzes small scale forest owners' economic, social, and environmental responsibilities. This will be done from the owner's perspective and using research about corporate responsibility. The owner and his family will be in the center. Local community, including neighbors and other businesses, are placed in the "next" circle. The "second circle" includes the society en large including the general audience, the government and its forest policy, and the forest products industry. The outmost circle consists of other nations and global policies or concerns. Local businesses and forest products companies, the local society, the politicians and public authorities are all interested in the small scale owners taking economic as well as social and ecological responsibilities. Other stakeholders stress the social and ecological responsibilities. Conflicts that may exist between the forest owner's perspective on responsibility and that of stakeholders are also addressed, for example between forest products companies and NGOs.

INTRODUCTION

The UNCED summit in Rio 1992 boosted a general consciousness of environmental, social and cultural issues. As one consequence, Corporate Social Responsibility, CSR, or shortly Corporate Responsibility, CR, has become an important concern for societies and among businesses and their stakeholders. CR simply refers to balancing economic, social, and environmental aspects. CR is fundamentally about ethics. The choice of behavior that is ethically "right" according to stakeholders is complex and context-dependent. The notion of sustainability is similarly controversial. Many stakeholders often have differing ethical and sustainability perspectives.

That businesses take responsibility is nothing new. In Sweden for example already during the 18th and 19th centuries the owners and managers of iron works took sort of a responsibility for the employees and their families. We still talk about a special culture for these villages and their works. Also small businesses and their owners have for long taken responsibilities, for example small scale forest owners.

The purpose of this article is to discuss different aspects of responsibilities for small scale forest owners. This will be done by applying the concept of the "modern" corporate responsibility literature on the behavior of small scale forest owners.

In order to give background and better understanding, the paper starts with an overview of relevant research about small scale forest owners, and is followed by a short overview of the

¹ Department of Forest Products, University of Agricultural Sciences, 750 07 UPPSALA, Sweden, +46 (0)76 118 13 44, Lars.Lonnstedt@sprod.slu.se

concept “Corporate Responsibility”. Based on these, different aspects of forest owners’ responsibilities will be discussed and related to the demands from different stakeholders.

SMALL SCALE FOREST OWNERS

Three different aspects will be presented: a change of owner structure, motives for ownership, and grouping of owners depending on their management strategies.

A changing owner structure

The owner structure of small scale estates has in western countries undergone major changes during the last three to four decades (Eriksson, 1989; Ripatti, 1996; Kvarda, 2004; Ziegenspeck *et al.*, 2004). Traditional family farms with a combination of agriculture and forestry still exist but have become less common. Farms have grown in size and become more specialized. At the same time it has become quite common to only own timber land. Arable and pasture land is sold or leased to a neighbor. For running this type of estate it is not necessary for the owner to live on the estate. Thus, many owners live in a local community or in cities. The supply of different types of services has increased, making this possible.

The major reasons for the changes of the owner structure are economic and social changes in the society (see for example Wiersum *et al.* 2005). The production efficiency has increased tremendously, also in agriculture and forestry. This means that one person can manage much larger areas than before. As a result the standard of living has increased and by that the demands for material well-fare. One way of achieving a higher wealth has been for many people living in the country side to move to the cities and wage works. The interests and demands for entertainment have also changed, not the least among young people. Cities have more to offer in this respect.

It is not a risky opinion to state that the result of changed owner structure is a collected change in responsibilities from the small scale forest owners. Agriculture is for most owners much more of a business than forest management. Thus it is likely that there has been shift from the economic aspects to the social and ecological aspects if the small scale owners are taken as a group.

Motives for ownership

A common reason for ownership is that the owner has inherited the estate. To generalize, the first step in the “heir process” is a widow and in the next step children, sometimes relatives, and so on.

It is quite common, at least in Sweden, that a neighbor buys an estate that borders his/her own or is relatively close by. In Sweden there is a tax incentive for this if it could be shown that it will facilitate rationalization. Other tax reasons also stimulate the buying of an estate. Another reason could be that the estate is relatively close to a city where the buyer can live on the estate and commute. Maybe the children are interested in horses. Maybe you just want to own a piece of land, enjoy working in the forest or are interested in forestry. Interest in hunting may be still another reason. Some persons may also buy an estate as an investment or for speculation purposes.

Zhang *et al.* (2005) argue that the number of small scale private forest ownerships in the U.S. has increased because a significant amount of forestland is no longer used primarily for timber production but rather for non-timber forest products and environmental services (particularly where population density is high). When a person makes frequent use of non-timber products and services, owning forest land is more efficient for them because it saves the transaction costs involved in getting products from the market. Forestland parcelization takes place when non-timber value increases faster than timber value and the marginal value of non-timber products is diminishing much faster than that of timber production. Rickenbach *et al.* (2005) observe that in the USA a significant increase in the number of small scale forest owners has taken place.

Hugosson and Ingemarson (2004) could not find any consistent views on the subjective grounds for owning and managing small scale forest estates. Still, different motives for ownership are probably reflected in the responsibilities that are taken by the owner. If the reason for the ownership is interest in nature, the responsibilities will probably differ from those taken by an owner that buys more timberland for being able to manage the forest in a more rational way.

OWNER CATEGORIES

This section is structured into two subsections. In the first, different suggestions how to group small scale forest owners are presented. In the following section I present research results about why differences exist between different owners or why a specific group can be distinguished. Certainly, the two sections are closely related and complement each other.

Grouping of owners

The intention with the grouping is to differentiate the owners depending on the interest in forestry, different goals for the management and differences in forest management strategies. Suggestions for how to group small scale forest owners can be found several decades ago (Trant *et al.* 1979; Kurz and Lewis, 1981; Green *et al.* 1986; Bliss, 1988; Lönnstedt, 1989, 1997).

Kurttila *et al.* (2001) grouped, according to McKinsey's matrix, small scale forest owners into four strategic groups: Stars, Cash cows, Wildcats and Dogs. This grouping was based on the forest owners' attitudes towards the internal and external operational environments of forestry. Enggrob Boon *et al.* (2004) identify three groups of owners: the classic forest owner to whom the forest has economic importance; the hobby owner who enjoys work and recreation in the forest; and the indifferent farmer to whom the different values provided by the forest are equally (un)important. Ingemarson *et al.* (2006) have classified the owners into five types: the "economist", the "conservationist", the "traditionalist", the "multi-objective owner" and the "passive owner". The results confirm recent studies suggesting that a sole emphasis on economic benefits is not desirable from the forest owners' point of view.

Reasons for differences

In this section special characteristics or features that may influence forest management behavior are presented. Examples are: Gender, education, profession, economic dependency on forestry, urban lifestyle.

Lidestav and Ekström (2000) find that gender of the Swedish owner has a significant effect on the frequency of harvesting, cleaning and supplementary planting, but not on planning and mechanized scarification. In the cases when the gender of the owner was a significant factor, the

degree of activity among the female owners was found to be lower. Results regarding harvested volumes did not expose any significant differences in harvesting management strategies between male and female owners.

A study conducted in Washington State by Creighton *et al.* (2002) suggests that educated and informed NIPF landowners are more likely to show interest in ecosystem-based management programs. Uliczka *et al.* (2004) show that attendance on the National Board of Forestry's educational programs, self-estimated knowledge about conservation and knowledge about forest species were all related with a positive attitude towards conservations. Education in forestry was related to knowledge about conservation but not to the attitude towards it. Dependence on income from the forest, age > 55 years and a land-use-related occupation, all indicated a less positive attitude. Compared with men, on average, women were less active owners with less forestry education, but younger women with high formal education had the most positive attitude of all.

Kvarda (2004) finds that non-agricultural Austrian forest owners are living in more urban areas, having non-agricultural professions and are relying on other sources of income than primary production. The forestland is viewed from a more socially oriented perspective with concern for enjoyment and utilization of timber for own needs and by coming generations. Ziegenspeck *et al.* (2004) write that the use of the forests by urban-oriented forest owners might be better explained by the specific features of such urban lifestyles rather than the classical features of income and social status. Wiersum *et al.* (2005) observe that many European small scale forest owners are no longer economically dependent on their forests and these owners appear to increasingly focus their management on amenity functions rather than on production functions. Their result shows that about 30% of the forest owners have an indifferent attitude to their forests. This group includes many absentee owners and retired local owners, who own only forest lands but who are not economically dependent on these forests. Almost 40% of the forest owners are only modestly interested in forest management; often they have an environmental management orientation. This group includes many hobby owners and part-time employed people. Only one-third of the private forest owners are still economically dependent on their forests; they have predominantly a multifunctional management orientation. Jensen and Ottitsch (2005) come to a similar conclusion: In the light of social and economic developments, forest functions other than timber production have gained international importance and recognition. Resulting from this development, non-wood forest products and services are becoming more important, both for the general public as for forest owners trying to market them.

Hugosson and Ingemarson (2004) finds that sets of interpretive and normative qualities are underlying people's actions, and that such set are related to basic values. Four motivations were depicted: Conservation, utilities, amenities and economic efficiency. A move towards conservation interests was indicated. The authors suspect that economic development in society may place material objectives, including traditional forest management, in a less preferable position.

One reason for grouping owners is to reflect different interests in forest and forestry, values and management styles. It is likely that this is reflected in varying responsibilities between different owner categories.

SOCIAL RESPONSIBILITY

Historically there were clear-cut roles and responsibilities for both business and governments, which were relatively independent of one another. And, these actors could neglect the impact on civil society. As complexity grew, business and government became mutually dependent entities. Since their coordinating mechanisms were incapable of adequately arranging various contemporary societal topics, the importance of the civil society increased. Various representatives stressed “new” values and approaches, which politics and business no longer could ignore (see, e.g. Albrict & van Gils, 2003, von Marrewijk, 2003). Business had and has to learn how to operate within interfering coordination mechanisms, with blurred boundaries and surrounding layers of varying degrees of responsibility, overlapping one other. Nowadays, governments increasingly leave societal issues within the authority of corporations (see e.g. Grayson & Hodges, 2004, 234; von Marrewijk, 2003). To at least some extent this is also the case for small scale forest owners. The demands and viewpoints from the society, the public, consumers of forest products, tourists and politicians have increased. The forest owners can not neglect this in their management of the forests.

Within the European Union, firms are expected to comply with a range of policy directives that address a wide range of concerns including protecting the environment and respecting employees’ rights. A given policy can be seen as an emerging construct that arises to address unforeseen problems or new social issues (Ars and van Tatenhove, 2005). Such policies can be considered as a formalization of norms or values that have arisen in society in general.

Reasons for the increasing willingness of businesses to behave in an ethically acceptable manner and to carry their share of a wider non-economic responsibility can be changing values, building images, preparing for future regulations and standards, and globalization of corporations, societies and politics (Mikkilä, 2006). Also the values of the forest owners change. Besides, many forest owners have always had a concern for the nature. However, the choice of behavior that is ethically “right” is problematic, as there is no model that defines how to behave in different operational environments. This problem has arisen especially in the natural resource-based industries such as forest products companies, as their dependence on natural resources binds them intensively and comprehensively to local societies wherever they operate. (ibid.)

Globalization has increased the number of stakeholders and enlarged the debate surrounding businesses. Some research has shown that firms that care for the environment and exhibit responsibility practices experience increased consumer purchase preference in addition to increased investment appeal (Gildea, 1994; Porter & Linde, 1995; Zaman *et al.*, 1996). It has been suggested that by adapting business practices and philosophies to social-cultural norms and societal values, businesses can improve the likelihood of securing their legitimacy or license to operate. The small scale forest owners also have a set of stakeholders with their demands for how to manage forests, for example neighbors, the local community, local businesses, forest products companies and their costumers, environmentalists, forest civil servants, people visiting the forests, politicians.

SUSTAINABLE FORESTRY CRITERIA

Different countries have defined criteria for sustainable forestry. For example Sweden defines it as “Management and use of land and forest in such a way and time that its capacity, both today and in the future, maintain important environmental, economical and social functions on a local,

national and global level without jeopardizing other ecosystems” (Berggren, 2007). The environmental dimension holds many functions that need to be protected for keeping a sustainable use. Examples of functions are species, their habitats and interaction between them. The economic dimension is related to the forest being a finite resource and other limited resources that can be exploited. The social values are about the value of forests for the people both from a material and non-material perspective. The concept includes values contributing the well-fare as nature experiences, cultural heritage, recreation, aesthetics, health of the people, hunting, working possibilities, infra structure and use of berries and mushrooms.

Finland’s criteria for sustainable forestry is based on the Pan-European criterion and are the following (The State of Forestry in Finland, 2000; see Järveläinen, 2008, p 82):

- Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles
- Maintenance of forest ecosystem health and vitality
- Maintenance and encouragement of productive functions of forests (wood and non-wood)
- Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems
- Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)
- Maintenance of other socio-economic and cultural functions and conditions i.e. the operating conditions of the forest sector in the national and regional economy, forest employment uses, the opportunities for public participation, cultural and multiple-use values (recreational values)

In this connection, there is a reason to mention forest certification which is a market initiated system for evaluating the sustainability of forestry. It covers all elements of sustainable forestry. It is a procedure, where an independent third party verifies through a certificate that the forests are managed and used according to agreed standards. The standards are usually based on the principles of ecologically, economically and socially sustainable forestry.

There are several international forest certification systems, where the sustainable forestry requirements and opportunities of different stakeholders (e.g. forest owners, forest industry and environmental organizations) to influence the process differ from one another. Two well-known systems in Europe are: FSC (Forest Stewardship Council) and PEFC (Program for the Endorsement of Forestry Certification schemes).

The FSC (2009) principles and criteria describe how the forests should be managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations. Ten principles form the basis for all FSC forest management standards.

- Compliance with all applicable laws and international treaties
- Demonstrated and uncontested, clearly defined, long-term land *tenure* and use rights
- Recognition and respect of indigenous peoples' rights
- Maintenance or enhancement of long-term social and economic well-being of forest workers and local communities and respect of worker’s rights in *compliance* with International Labour Organisation (ILO) conventions
- Equitable use and sharing of benefits derived from the forest

- Reduction of environmental impact of logging activities and maintenance of the ecological functions and integrity of the forest
- Appropriate and continuously updated management plan
- Appropriate monitoring and assessment activities to assess the condition of the forest, management activities and their social and environmental impacts
- Maintenance of High Conservation Value Forests (HCVFs) defined as environmental and social values that are considered to be of outstanding significance or critical importance
- In addition to *compliance* with all of the above, plantations must contribute to reduce the pressures on and promote the restoration and conservation of natural forests.

PEFC (2009) defines sustainable forest management as the stewardship and use of forests and forest land in a way and at a rate that maintains their biodiversity, productivity, regeneration capacity, vitality, and their potential to fulfill now and in the future, relevant ecological, economic and social functions, at local, national and global levels, and does not cause damage to other ecosystems.

Certainly the forest policy, the NGO activities and demand from the markets have an impact on the small scale forest owners. It should be remembered that the values expressed in this way will change over time.

HYPOTHESES

Stakeholders expect small scale forest owners and his/her families to take responsibilities concerning economic, social and ecological aspects when managing their timberlands. In the following text I will discuss what expectations that come from which stakeholder and the response from the owners. I will start with a discussion of the meaning of the concepts economic, social and ecological aspects.

Economic aspects are related to the financial performance i.e. rate of return, wealth creation and cash flow. All these aspects are of importance for the small scale forest owner even if the cash flow in the short run may be of most importance and in the long run wealth creation. Financial aspects are often strongly linked to wood production. However, for some owners the economic aspects also include income from for example hunting licenses or tourist activities as fishing and lodging.

Social concerns cover many different aspects. It can include the interaction with the local community and its local businesses. Legitimacy is in this context of importance as it is important for the owner to have a functional long-term relationship with the local community and local businesses. Social responsibility can also include creating profit as this means a surviving business, tax-payments and for the local industry timber supply. Ethical and cultural aspects are also covered by this concept. Landscape concern should also be included in this concept. Other aspects, not as relevant for small scale forest owners in western countries who typically not him/herself is an employer, are human rights, employee welfare, gender and social equality, minimum wage, safety and health benefits. Charitable contribution is still an example as is pollution control.

Ecological aspects include a concern for the nature, i.e. a sustainable development of the nature with its plants, insects and animals, and environmental protections.

Table 1 presents an overview of the different stakeholders' demands for responsibilities. It could certainly be discussed which stakeholders that have what demand. This is a starting point for such a discussion.

Table 1. Overview of responsibilities that different stakeholders expect the small scale forest owner to take.

STAKE HOLDERS		RESPONSIBILITIES		
		Economic	Social	Ecological
LOCAL COMMUNITY	Neighbors		X	X
	Local businesses	X		
	Local society	X	X	X
SOCIETY	Forest products industry	X	X	X
	Consumers of forest products		X	X
	Environmentalists			X
	Tourists		X	X
	Hunters		X	
	General public		X	X
	Politicians and public authorities	X	X	X
THE GLOBE/ WORLD				X

Economic aspects

Predominately economic aspects are of interest for the owner and his/her family but also for the businesses using wood raw material as a base for their production and for the local community. It is important for forest products enterprises that the profit of small scale forest owners is high enough for them to stay in the business, make investments in silviculture and roads, and thus continue to produce timber. This is also important for the local community as it means an important base for local businesses based on wood and also tax incomes. This is also a reason for politicians and authorities looking after the implementation of the forest policy to be concerned about the financial situation of the small scale forest owners.

Even if the income from forestry for most small scale owners has been marginal compared with the income from farming, other businesses or employment, it plays a role. It is important with a positive cash flow, not the least when there is a need of money. In the long run the wealth creation is of interest as it represents the state of the forests. For many families it is natural that the estate should stay in the family and that it is in a better shape when it is inherited by the children compare with the state when they started to manage the estate.

However, nowadays the values are changing with new generations of forest owners, especially if they do not live on the estate but in a city and have wage earnings. The economic importance of the timberland has decreased while other aspects have increased in importance.

H₁: Stakeholders as the forest products companies, local communities, political parties and public authorities are interested in the economic responsibility of the owner.

Social aspects

When writing about the economical aspects I already touched upon the interaction with the local community and the local wood based businesses which is examples of social considerations. For a forest owner it can give legitimacy to sell timber to a local mill instead of to a distant mill.

One aspect of the social responsibility is the recreational aspect that has become quite important with increasing standard of living and more leisure time.

More emphasis has been put on cultural values represented by remains of old settlements both from the 19th century but also centuries ago. It is in the interest of the society and local communities to save these remains but certainly also because it is in the interest of many people. Many forest owners will happily preserve these cultural values.

The same group of stakeholders is, due to the same reasons, also interested in the landscape picture and scenic beauty. This is also a reason for these stakeholders to be interested in the financial performance of the small scale forest owners as this is a way for achieving this wish. My experience is that many small scale forest owners are interested in the “small picture”, i.e. they are willing to keep meadows, open grasslands or single trees because it makes a “beautiful picture”. Perhaps this could be seen as an example of ethnical values?

H₂: Most stakeholders are expecting the owner to take social responsibilities

Environmental aspects

In many western countries it has been natural for more than 100 years for the small scale forest owners to manage their forests in a sustainable way. This was in line with the wish to leave the estate to the next generation in a better state than it was inherited. This was also in the interest of the forest products companies, the society and the local communities.

However, the concept of sustainability has since a couple of decades ago been given a much broader meaning. Sustainability today includes plants, insects, animals and also social aspects. Environmentalists, consumers of forest products, the public and politicians are demanding a sustainable development in all aspects. Many forest owners do or did not have enough knowledge about rare species for being able to save them. It can also have quite a negative impact for a small scale forest owner if a major part of his timberlands have to be put aside as natural reserves.

Environmental concern today also includes ecological aspects. The forests assimilate carbon dioxide which is of importance for handling the greenhouse effect. As timber is a renewable resource it may to a certain degree replace fossil fuel. The greenhouse effect is a global concern as well as a national.

H₃: Most stakeholders are expecting the owner to take environmental responsibilities

CONFLICTS

In my opinion small scale forest owners are interested and willing to take economic, social and environmental responsibilities. There may be an argument about to what extent social and environmental aspects ought to be considered. Over the years the potential conflicts have decreased. It is likely that it will be even more so with new owners with other values.

There is a potential conflict between the interest of timber production for the forest products companies and the cash flow for the owner on one hand and environmental and social concerns on the other. However, it must be said that nowadays the owners and the companies accept that environmental and social responsibilities must be taken. However, if there is a shortage of wood supply they may be a limit for this understanding. One result may be in a country like Sweden that the pressure for the establishment of plantations increases. Environmental and social considerations may also have an impact on the efficiency of the operations which will affect the financial result.

For a small scale forest owner there may be an economic draw back if a major part of his/her timberland area is put aside because of its environmental values. However, in many countries he/she will have a financial compensation.

As have been said many owners today do not see timber production as their primary goal. They may be more interested in environmental and social considerations. For them no conflicts will arise. However, still for the forest products companies needing wood raw material new generations of small scale forest owners with new values and behavior may be a threat.

Another conflict may exist between recreation and financial interests. In many countries recreation does not for many small scale forest owners create any economic value. On the contrary, if the number of visitors is big as it can be close to big cities it may create a problem. However, for the local communities it may mean a lot of tourists which will spend money at the local shops, restaurants and hotels.

Another type of conflict may exist between social and environmental considerations if areas are put aside with no access. This may be the only way to prevent heavy wear and tear.

As can be understood there exist conflicting interests between some of the stakeholders, often between those stressing the economic values and those stressing the social and/or environmental values, for example between the forest products industry and environmentalists. However, these conflicts are much less pronounced nowadays.

COMMENTS

During the last decades the interest in Corporate Responsibility has increased. Responsibility includes economic, social and environmental aspects. It has become natural for more and more businesses to incorporate their responsibilities towards the society. Many stakeholders demand this. Also for small scale forest owners it is natural to consider their responsibilities towards their stakeholders. However, the demands have changed over time as have also the weight of different stakeholders. Even if some aspects of the responsibilities have existed for a long time the dominating responsibility was until some decades ago timber production which was a major concern of forest products companies and many governments. However, the importance of more

soft values from the forests has increased. When discussing responsibilities that the small scale forest owners takes or are expected to take it is important to understand their situation and how they themselves look at their management.

The income from forests can play an important role in maintaining a sound social structure, and forestry can contribute to the overall economy of rural areas. However, the impact and importance of the non-market values of the forests are increasing, not the least among new generations of forest owners. The land ownership structure and management goals for forestry are heterogeneous and becoming even more so. A major future issue in addressing the concern on environment is the allocation of the costs of nature protection. Forest certification and the role of forests in implementing the Kyoto Protocol have raised much discussion. Thus, it is no wonder that small scale forest owners have interested researchers for many decades.

The owner structure has undergone big changes. Originally forestry was for many farmers a natural part. Today it is common that the owner only manage forest and that many of these owners are living in cities and have a wage income. This has an impact on the management strategy. For some owners the major goal is not timber production but more soft values. The owners can be grouped with this as criteria. However, there are many other ways and reasons for grouping the owners. Quite a common way for becoming an owner is to inherit the estate from the parents. However, it seems as if the market way is increasing.

A small scale forest owner has economic, social and environmental responsibilities, toward himself/herself and the family but also towards stakeholders. Different stakeholders at least partly stress different demands on the responsibilities. The forest owners comply with many of the demands but not with all. It must also be remembered that the small scale forest owners are a heterogeneous group which means that the fulfillment varies between the owners. Furthermore, the owner structure changes as do the responsibilities.

A stakeholder that wants to be successful in explaining his/her demands for responsibilities must argue based on the motivations of private forest owners. It is also wise to actively involve the owners in the discussion and decision making.

As a next step in research about small scale forest owners' social responsibility a starting point could be an explorative study clarifying different owners' and stakeholders' view on responsibilities. Based on this result a statistical investigation could be made to get a base for generalizing the results.

REFERENCES

- Alberic P. and Van Gils, A. 2003. Stimulating Ethical Decision-making in a Business Context: Effects of Ethical and Professional Codes. *European Management Journal*. 2003. Vol 21, no. 6, 762-772
- Arts B. and van Tatenhove, J. 2004. Policy and power: A conceptual framework between the 'old' and 'new' policy idioms. *Policy Sciences* 37:339-356.
- Berggren, U. 2007. Hållbart nyttjande av skog. Meddelande 5, Skogsstyrelsen, Jönköping.
- Bliss, J.C. 1988. Motivations of Nonindustrial Private Forest Managers: A Qualitative Approach. PhD thesis (forestry), University of Wisconsin, Madison, USA.

- Creighton, J.H., Baumgartner, D.M. and Blatner, K.A. Ecosystem Management and Nonindustrial Private Forest Landowners in Washington State, USA. *Small-scale Forest Economics, Management and Policy*. 1(1) 55-69.
- Enggrob Boon, T, Meilby, H. And Jellesmark Thorsen, B. An Empirically Based Typology of Private Forest Owners in Denmark: Improving Communication Between Authorities and Owners. *Scandinavian Journal of Forest Research*. 19(4) 45-55.
- Eriksson, M. 1989. Ägarstrukturens förändring inom privatskogsbruket – i ett historiskt perspektiv (Change of small scale forest owners' structure – a historical perspective). The Swedish University of Agricultural Sciences, Department of Forest-Industry-Market Studies, Report No 26.
- FCS, <http://www.fsc.org/pc.html>, accessed 2009-02-18.
- Gildea, R.L. 1994. Consumer survey confirms corporate social responsibility affects buying decisions. *Public Relations Quarterly*. 39(4):20-21.
- Grayson, D. and Hodges. A., 2004. Corporate social opportunity! 7 steps to make corporate social responsibility work for your business. Greenleaf publishing, Sheffield, the UK.
- Green, J.L. and Blatner, K.A. 1986. Identifying Woodlot Owners Characteristics Associated with Timber Management. *Forest Science* 1
- Hollender, J. and Fenichell, S., 2004. What matters most. How a small group of pioneers is teaching social responsibility to big business and why big business is listening. Basic Books, New York
- Hugosson, M. and Ingemarson, F. 2004. Objectives and Motivations of Small-scale Forest Owners; Theoretical Modelling and Qualitative Assessment. *Silva Fennica* 38(2): 217-231.
- Hyttinen, P. 2001. Prospects for Small-Scale Forestry in Europe. Published in *Economic Sustainability of Small-Scale Forestry*. Eds A. Niskanen and J. Väyrynen. International IUFRO Symposium. EFI Proceedings No. 36.
- Ingemarson, F., Lindhagen, A and Eriksson, L. 2006. A typology of small-scale private forest owners in Sweden. *Scandinavian Journal of Forest Research* 21(3) 249-259.
- Janse, g. and Ottitsch, A. 2005. Factors influencing the role of Non-Wood Forest Products and Services. *Forest Policy and Economics*. 7(3) 309-319.
- Järveläinen, V-P. 2008. Decades of private forestry in Finland. TTS tutkimuksen julkaisuja 402, Nurmiljärvi.
- Kurz, W.R. and Lewis, B.J. 1981. Decision making framework for nonindustrial private forest owners. An application in Missouri Ozark. *Journal of Forestry*. May 285-288.
- Kurttila, M., Hämäläinen, K., Kajanus, M. And Pesonen, M. Non-industrial private forest owners' attitudes towards the operational environment of forestry – a multinomial logit model analysis. *Forest Policy and Economics*. 2(1) 13-28.
- Kvarda, E. The Future of European Forestry – Between Urbanization and Rural Development. 'Non-agricultural forest owners' in Austria – an new type of forest ownership. *Forest Policy and Economics*. 6(5) 459-467.
- Lidestav, G. and Ekström, M. 2000. Introducing Gender in Studies on Management Behaviour Among Non-industrial Private Forest Owners. *Scandinavian Journal of Forest Research*. 15(3) 378-386.
- Lönnstedt, L. 1997. Nonindustrial Private Forest Owners' Decision Process. A Qualitative Study about Goals, Time Perspective, Opportunities and Alternatives. *Scandinavian Journal of Forest Research*, 12: 302-310.

- Lönnstedt, L. 1989. Goals and Cutting Decisions of Private Small Forest Owners. *Scandinavian Journal of Forest Research*. 4 (2): 23-29.
- Mbare, O. 2004. The role of Corporate Social Responsibility (CSR) in the New Economy. *EJBO, Electronic Journal of Business Ethics and Organization Studies* 9(1) (Available at http://ejbo.jyu.fi/articles/0901_5.html. Web site accessed August 12, 2008.
- Mikkilä, M. 2006. The many faces of responsibility: Acceptability of the global pulp and paper industry in various societies. The Finnish Society of Forest Science, Unioninkatu 40A, 00170 Helsinki, Finland <http://www.metla.fi/dissertationes>. Web site accessed June 24, 2008.
- Nilsson, A. 2005. Hållbarheten morot i en ny strategi; Dyrköpt startskott.CSR-arbetet bör kopplas till riskhantering – nu. *Dagrens Miljö* (6):10-13, 22-23.
- PEFC, <http://www.pefc.se/english/index.asp?path=12677&pageid=17287>, accessed 2009-02-18
- Porter, M. & Van der Linde, C., 1995. Green and Competitive: Ending the Stalemate. *Harvard Business Review*, September-October, 120-134.
- Rickenbach, M., Zeuli, K. and Sturgess-Cleek, E. 2005. Despite failure: The mergence of “new” forest owners in private forest policy in Wisconsin, USA. *Scandinavian Journal of Forest Research*. 20(6) 503-513.
- Ripatti, P. 1996. Factors Affecting Partitioning of Private Forest Holdings in Finland. A Logit Analysis. *Acta Forestalia Fennica* 252.
- Takala, T. 1996. From Social Responsibility to Environmental Responsibility – Change in the Finnish Business, Ethics and Organization Studies. 1(1) (Available at http://ejbo.jyu.fi/index.cgi?page=articles/0101_2).
- Thayer Robbins, P. 2001. Greening the Corporation. Management strategy and the environmental challenge. Earth Scan Publications Ltd., London.
- Trant, M.J. and Brinkmann, G.L. 1979. A classification of limited resource farmers. *Canadian Farm Economics* 14:1-2.
- Uliczka, H., Angelstam, P., Jansson, G. and Bro, A. 2004. Non-industrial private forest owners’ knowledge of and attitudes towards nature conservation. *Scandinavian Journal of Forest Research*. 19(3) 274-288.
- Van Marrewijk, M. 2003. Concepts and Definitions of CSR and Corporate Sustainability: Between Agency and Communion. *Journal of Business Ethics*. 44 (2/3):95-105.
- Wiersum, K., Elands B.H.M. and Hoogstra, M.A. 2005. Small-Scale Forest Ownership across Europe: Characteristics and Future Potential. *Small-scale Forest Economics, Management and Policy*. 4(1): 1-19.
- Zaman, M., Yamin, M. and Wong, F. 1996. Environmental consumerism and buying preferences for green products. In: Proc. of the Australian Marketing Educators’ Conference. Theory and Application. Volume II. C. Riquier and Sharp, B. eds. Marketing Science Centre, Univ. of South Australia, Adelaide, Australia. PP 613-626.
- Zhang, Y., Zhang, D. and Schelhas, J. 2005. Small-Scale Non-industrial Private Forest Ownership in the United States: Rationale and Implications for Forest Management. *Silva Fennica* 39(3) 443-454.
- Ziegenspeck, S., Härdter, U. and Schraml, U. 2004. The Future of European Forestry – Between Urbanization and Rural Development. Lifestyles of private forest owners as an indication of social change. *Forest Policy and Economics*. 6(5) 447-458.

FORESTRY FLIX: EVALUATING THE NETFLIX MODEL FOR ACCESSING URBAN AND RURAL POPULATIONS IN THE CENTRAL APPALACHIAN REGION USING A WEB-BASED DVD CIRCULATION PROGRAM

Daniel J. Magill¹ and David W. McGill²

Abstract--In West Virginia, as throughout the Appalachian Region of the USA, approximately 76% of the forestland is privately owned by an estimated 250,000 private individuals and families. Although these forest owners are a large diverse group, only a small percentage is engaged in active forest management. The challenge to forest management organizations is to promote sound stewardship practices on this mosaic of properties owned by people with diverse objectives and motivations. This project was designed to test the Netflix business model for engaging private individuals in an educational outreach program to allow private forest owners and all citizens to learn how to properly conserve, manage and sustainably use their woodland resources from the comfort of their own homes. In 2007 and 2008, the authors developed and circulated a series of forestry and wildlife management activity DVDs using the Netflix business model for a six month period. This paper summarizes the development, implementation and evaluation of this outreach program.

INTRODUCTION

In today's world where adapting to and riding the winds of change is the norm, education is a key component for guiding individuals and society toward healthier lives, communities, and natural and urban environments. Forests and the ecosystem services they provide have become indicators of environmental health. With the majority of forestland ownership in the eastern USA held by private individuals who generally are not actively managing their land, or who are oblivious to their roles in ecosystem health and productivity, it is crucial for government and non-government forest education organizations and private environmental and forestry businesses to engage these owners and connect them with the broader 'forestry sector'.

Throughout the Appalachian Region the majority of the forestland is owned by private individuals. For example, in West Virginia (WV) approximately 70% of the 4.8 million woodland hectares in WV is owned by private citizens. That ownership population constitutes more than 250,000 people (Birch 1994). Moreover, only about 15% of these owners have been in contact with a forestry professional, or received educational or monetary assistance to manage their forest land (Magill *et al.* 2004).

From the standpoint of forest industry and agencies involved in outreach to these landowners, most private forest owners (PFLs) can be considered 'non-participant' individuals who carry out

¹ dmagill@wvu.edu

^{1,2} Appalachian Hardwood Center, West Virginia University, PO Box 6125, Morgantown, West Virginia, USA.

little in the way of sustainable forest management and are not in any regular contact with forestry education programs or technical assistance (Steiner-Davis and Fly 2004).

In this Forestry Flix project, the Netflix business model (Netflix, Inc. 1997; Dutra *et al.* 2004) is assessed as a method for engaging landowners and the general public in educational programs intended to stimulate their interest in forestland ownership, use and sustainability, and to increase their awareness of the forestry professionals and organizations that are available to assist them with forestry education and forest management activities. Through this project, the authors investigate the use the Netflix business model as a delivery mechanism for a forestry and wildlife education and awareness program intended to inform and arouse the curiosity of individuals with regards to the forestland they own and to the forestry professionals and organizations that are available to assist them with further forestry education or forest and wildlife management activities. Additionally, the advantages and disadvantages of using this successful business model as an outreach education format, particularly for accessing non-participant landowners is investigated.

In 2007 and 2008, the authors developed and circulated a series of forestry and wildlife management activity DVDs using the Netflix business model for a six month period.

METHODS

The funding grant for this project titled A Forest Conservation Outreach Program Using the Netflix Model in WV and Western Maryland was awarded on November 26, 2007. The grant requested methods for reaching landowners and members of the general public who are not ordinarily able or willing to go out to training events that offered forestry and/or wildlife management educational information. The intent of this project was to allow those who participated in the Forestry Flix DVD circulation program the luxury of learning about these topics of interest in the comfort of their own homes. The grant specified a one year project timeline to apply and conclude the Forestry Flix project. Project goals would be accomplished by providing a quick source for individuals to obtain free DVDs about forest and wildlife management.

The authors generally followed the protocol of NetFlix, Inc. to test the effectiveness of the Netflix model (described by Dutra *et al.* 2004) as an educational outreach tool. NetFlix (<http://www.netflix.com/>) is an online movie rental service that charges a fixed monthly fee for movie rentals delivered to customers' homes via the US Postal Service. The fee depends on the number of movies the customer chooses to have 'out at-a-time.' In this project, a similar website (<http://www.forestryflix.com>) was developed as a medium for featuring the list of available forestry and wildlife videos. From this webpage, project participants could create an account, set up an order list, and prioritized their choices from among the seven forestry and wildlife DVDs that were offered. Project participants were people that had either found the webpage online or had contacted the authors at the WVU Appalachian Hardwood Center via webpage, email or telephone after hearing advertisements for the project. The circulation process was set up so that a participant could order as many of the DVDs they wanted and could keep them as long as they liked (DVD Circulation Protocol Figure 1). Once participants returned a DVD, they were mailed their next choice, until they had received and returned all of their order choices. This project differed from the NetFlix model in that there were no rental charges.

Online website activities of project participants who ordered DVDs (i.e. number of orders, order and return dates, list of preferred DVDs, problems with the webpage) and with the DVD distribution process were recorded for evaluation purposes. Participant tracking data were maintained for each participant following protocols to assure participant confidentiality.

The authors developed all but one of the DVDs for this project. Topics on these DVDs included:

- Back Yard Wildlife Management
- Best Management Practices (BMPs)
- Forest Measurements (e.g. biometrics, mensuration)
- Management and Ecology of Wildlife Game Species
- Silviculture
- Timber Harvest Contracts

The seventh DVD offered on the website was ‘Managing Your Woodlot’, which was formerly a 9 VHS video series produced by the WVU Extension Service, the USDA Forest Service, and the West Virginia Division of Forestry that was recently converted to DVD (Kidd 2008).

A ‘fun quiz’ that pertained to the respective DVD topic was sent along with each DVD to determine if the participant understood the information on the DVD. The individuals who ordered and returned their quizzes along with their DVDs received a certificate of completion and a corrected and graded quiz.

Advertising the Project to Landowners and the General Public

Four media were used to advertise and encourage participation in this educational opportunity (Table 1). Mass media advertising was broadcast by one television network, five radio stations, 10 local and regional newspapers, and one web-based newspaper. Addresses for 2000 West Virginia residents were purchased from an online direct mailing company. Postcards were sent to these residents with information and the web link to the Forestry Flix project website. This advertising process ran from June 1 to August 1, 2008.

Project Evaluation

The initial part of this project was concluded on October 31, 2008. Subsequently, a mail survey questionnaire following the Dillman method (2000) was used to assess the effectiveness of the project. At the time of writing, DVD orders are still being mailed and processed. However, only those DVDs ordered from June 1 to October 31, 2008 were included in the mail survey, data analysis and results. The questionnaire included inquiries into participant demographics, usefulness and clarity of DVD topic meaning, level of engagement including reasons for continued or curtailed participation, and general satisfaction with the DVDs. Questionnaires were mailed with coded return labels in order to link respondents with project engagement.



Figure 1. Circulation protocol for the Forestry Flix project

Table 1. Advertising distribution of the Forestry Flix project

Media method	Distribution of Recipients	Distribution Area of Media	Advertisement & Broadcast Length	Total Cost per Media type
Cable TV (1)	44,750	4 WV counties	30 seconds	\$1,129
Radio stations (5)	558, 600	VA, WV, MD, PA	60 sec (2) 30 sec (3)	\$3,231
Newspaper Ads (10)	310,127	VA, WV, MD, PA	Mon, Tues, Weds, Thurs, Sat, Sun	\$2,488
Newspaper Ad Online (1)	Unlimited	Worldwide	Mon-Sun	\$15
Direct mailing	2,000	WV, MD		\$560

Numerical Analysis

Classification of respondents as ‘non-participants’ was made by selecting individuals that had 1) never attended a forestry or wildlife workshop, 2) did not have a forest stewardship plan, 3) did not belong to a forestry-related organization, and 4) had never contacted a forester. This category served as one indication of the effectiveness of the NetFlix model in reaching individuals that would not normally take the time to travel to an educational event.

Beyond standard descriptive analysis for survey questions, logistic regression with a stepwise selection routine was used to explore factors related to selections of the various DVDs offered in the project. These were followed up by contingency tables to identify significant variables. The initial variables in the stepwise variable selection process were those that accounted for participants’ project engagement, educational and management preferences, and demographic characteristics. Significance levels for Chi-square tests were set at $\alpha \leq 0.10$.

PROJECT OUTCOMES

By March 6, 2009, 63 of the 163 questionnaires that were mailed had been returned (40%) and were used in the analysis. The 63 individuals who returned the survey had ordered 238 DVDs and 162 of those were mailed out. Again, participants would receive subsequent orders only after returning a previous order. Of the 162 DVDs sent out, 106 were returned and 58 percent of those returns included completed fun quizzes.

Demographics and Forest Property Attributes

Of the 63 respondents, 73% were males and 26% females, and 1% did not respond. The average age of these individuals was 51 years. Most resided in West Virginia (84%), Pennsylvania (6%), or Virginia (6%). Most respondents had completed high school or vocational technology training (58%). College graduates made up the remaining group including Associates and Bachelor degrees (19%) and post-graduate degrees (23%). The average annual income of these individuals was \$90,000; however, when the nine individuals who earn \$80,000 or more were removed, the average fell to \$55,000 annually.

About 73% of the respondents own forestland property, amounting to 1,423 ha, an average forestland holding of 31 ha. Twenty one of the forestland ownerships (85%) are located in West Virginia, followed by 4 percent in Virginia, Pennsylvania and Connecticut, respectively. Of the 46 individuals who own forest property, 43% have forest stewardship plans to assist them in managing their forests.

When asked if they have ever communicated with a forester, 29 individuals (46%) indicated they had. Of these 29 individuals, 76% of the contacts were by telephone, 66% by property visits, 21% by postal mailings, and 17% by e-mail. Fourteen respondents belong to some type of forestry or wildlife management organization.

Non-participants, as defined above, made up 38% of the respondents. Of these, 13 (54%) actually owned forest property. Hence, 20% of all respondents were non-participant landowners.

The most prevalent problems associated with forest ownership reported by the forest property owners included dealing with trespassers and all terrain vehicles (21%), and a lack of money to manage their forestland together with how to manage their forests properly, which were both indicated by 17% of the respondents who own forest property.

DVD Project Assessment

The number of DVD topics watched by the 63 individuals who returned the DVD questionnaire is presented in Figure 2. Most of the respondents (57%) had received only one DVD by the close of the assessment period. The most popular DVD ordered and received was Back Yard Wildlife Management (34 participants). In order of DVDs received, the others were Managing Your Woodlot (24), Best Management Practices (19), Management and Ecology of Wildlife Game Species (18), Timber Harvest Contracts (12), Forest Measurements (10), and Silviculture (8).

Project participants were asked to rank the helpfulness, understanding, easiness of website use, and repeated website use on a four-point (1-4) frequency scale with the number four being the highest positive ranking. Respondents generally found the Forestry Flix website easy to use (mean rating=3.67) and understood the content of the DVDs (3.68). The helpfulness of the information content on the DVDs, however, had slightly lower ratings (3.10; Table 2).

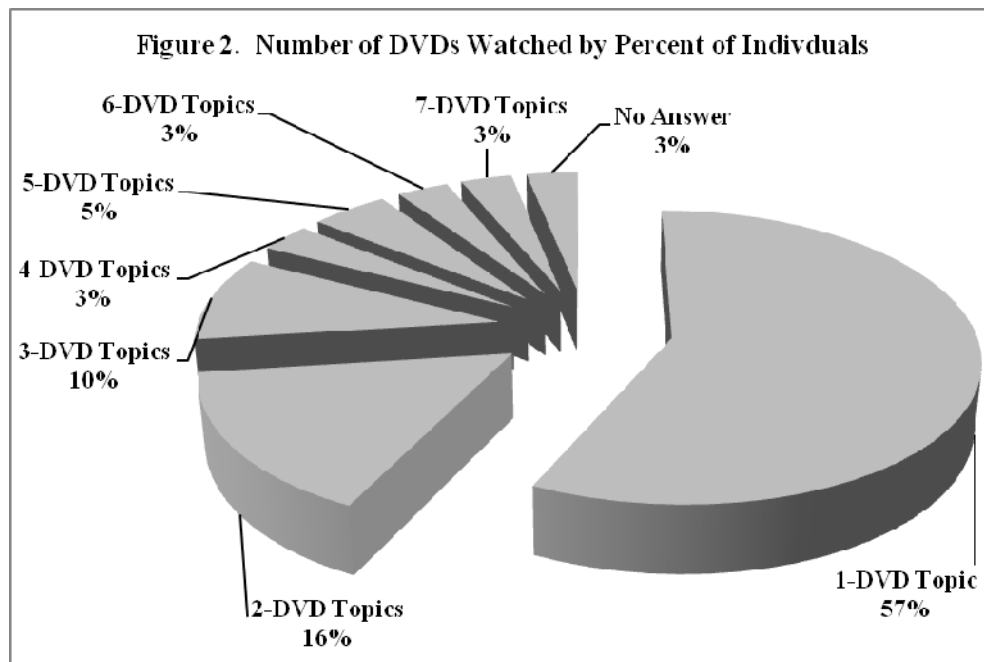


Figure 2. Number of DVDs received by project participants

Table 2. General project usefulness rating levels by 63 respondents

Rating level	Helpfulness of DVDS watched	Understanding of DVDS watched	Easiness of website to use	Repeated future website use
Average	3.10	3.68	3.67	3.67
Number of respondents	63	63	63	63
Max = 4	24	46	46	46
3	24	16	15	15
2	13	0	1	1
Min = 1	1	0	0	0
No Response	1	1	1	1

Respondents heard about the Forestry Flix project from a variety of sources. Forty-two read about the project in paid newspaper ads, 10 found the website from computer online ads, five heard about it from a friend, and two saw ads on cable television. None of the survey respondents had heard the project advertisements on radio broadcasts.

Fifteen survey respondents did not return their first DVD prior to filling out the questionnaire. When asked why they had not, the most prevalent answer was that they did not know they were supposed to return one DVD before getting subsequent DVDs (35%). Other reasons for not returning DVDs included 'not done watching the DVD' (29%) and 'misplaced the DVD' (12%). A similar question was asked concerning the 'fun quizzes'. The reasons why 28 of the respondents did not return quizzes that contained questions about the DVDs they had watched was they thought the quizzes were for them to keep (19%). An additional 11% responded that they had forgotten about the quiz. One third of the respondents did not answer the question.

Impact, Continued Interest, and Willingness to Pay

Survey participants also responded to questions concerning activities they had carried out as a result of watching the DVDs. Twenty-five respondents had carried out management practices. These included establishing wildlife food plots (72%) and tree thinning (40%).

Out of the 35 individuals who returned a fun quiz sixty-six percent scored 90% or greater; 25% scored 80 to 89%; and 9% scored 60 to 79% correct.

Respondents listed other topics that would be useful to their interests and efforts. The most frequently listed topics were wildlife food plots and management (15%), and 2) how to deal with forest pests and invasive plants (15%).

Concerning further education on forestry and wildlife topics, 53 preferred DVDs, 39 would like to receive books or other publications, 34 indicated they would like to attend outdoor workshops, and 20 would like to attend indoor workshops. Nineteen of the respondents indicated they had attended an average of 2.3 workshops (median=2).

When asked about interest and willingness to pay for additional workshops in forestry and wildlife, 47 respondents answered that they would pay an average of \$58.51 for a workshop. Answers ranged from \$5 to \$500 (median=\$50). Fifty-three respondents indicated that they would be willing to travel an average of 53 miles to attend a workshop of interest (min=10 miles; max=250 miles).

Factors Related to Type of DVD Ordered

Few demographic or preference variables were related to the specific type of DVD that was ordered by project participants. In fact, the only variables related to DVD topics were their status as an active or non-participant landowner and the participants' state of residence (WV vs. out-of-state). Proportionally more non-participant landowners viewed the Managing Your Woodlot video than did active landowners ($\chi^2=3.06$; $df=1$; $p=0.080$). Almost two-thirds (61%) of the non-participant landowners had viewed this DVD in contrast to only one-third (33%) of the active landowners. The Forestry Flix DVD projects participant's state of residence was statistically related to whether a participant ordered a given DVD for three topics: backyard wildlife ($\chi^2=4.51$; $df=1$; $p=0.034$), forest measurements ($\chi^2=5.18$; $df=1$; $p=0.023$), and wildlife game

species ($\chi^2=5.75$; $df=1$; $p=0.017$). With respect to the Backyard Wildlife DVD, West Virginia project participants were more likely to request this DVD than out-of-state participants, 57% (WV) compared to 20% of out-of-state participants. Conversely, out-of-state participants were more likely to select forest measurements and wildlife and game species DVDs than WV participants.

DISCUSSION

One of the most surprising outcomes of this project is that only 50% of those who ordered and received DVDs returned them. Reasons for this large group retaining the DVDs are likely similar to those offered by survey respondents, that they did not know that they were supposed to return the DVD prior to getting another, that they had misplaced the DVD, or they were not done watching the DVD.

It is well known that there exists a great interest in wildlife management in the USA ranging from urban and rural backyards to game species of forest and field areas (Mills *et al.* 1996). This interest in wildlife was confirmed in this project in that 72% of the respondents that implemented a project on their property as a result of watching the DVDs have established food plots, put out constructed feeders, or conducted some type of wildlife management. This landowner behavior is corroborated in a study conducted by Lorenzo and Beard (1996), who found forest property owners ranking wildlife habitat enhancement, proliferation and protection to be their most important objective. Further substantiating this active interest in wildlife ecology and management is the request for further information; the single most frequent request for other DVD topics was for methods on establishing wildlife food plots.

Forestry Flix participants were interested in a broad spectrum of forestry and wildlife management subjects they prefer in both future educational website DVDs and at indoor classrooms and forest or field workshops. These results are not unlike others that have found a broad interest in diverse forest stewardship topics (e.g. Magill *et al.* 2004). As a testimony to their willingness to engage in continuing forestry and wildlife education programs, most respondents were willing to travel moderate distances and pay a moderate amount to attend an educational workshop.

Demographics obtained from this study showed that middle age landowners with moderate annual income and minimal educational levels were the group most prevalent in participating in the Forestry Flix DVD program. Challenges in managing forestland for Forestry Flix participants were similar to those found by Belin *et al.* (2005), where trespassing, especially by all-terrain vehicles (ATVs), was their most important problem of forest ownership and management, followed by a lack of finance and lack of knowledge on how to properly manage their forest resources. With respect to continuing education using this mailed DVD strategy, all of the respondents indicated they would use this type of service again, found the information helpful and understandable, and found the website easy to use.

CONCLUSIONS

Non-participant landowners made up 20% of the respondents in the project follow-up survey. Out of our 63 respondents, 32% conducted some type of forest or wildlife management practices as a result of watching the DVDs provided them. Sixty three percent of these 63 individuals were

interested in learning about other topics apart from the ones they received from this project. Most were interested to receive additional lessons in wildlife management. This group of respondents is also willing to pay about 50 dollars and travel approximately 50 miles to attend a forestry or wildlife management educational event.

ACKNOWLEDGEMENTS

The authors thank E. Norland and the USDA Cooperative State Research Education Extension Service for their funding and logistic support of this project. We would also like to thank B. Spong, J. Brooks, W. Grafton, E. Heitzman and S. Moss for developing the lectures and assisting us in filming the DVDs.

REFERENCES

- Belin, D. L., Kittredge, D. B., Stevens, T. H., Dennis, D. C., Schweik, C. M., and B. J. Morzuch 2005 Assessing Private Forest Owner Attitudes Toward Ecosystem-Based Management. *Journal of Forestry* 103 (1), pp. 28-35.
- Birch, T.W. 1994 *Private Forestland Owners of the Northern United States*: Resource Bulletin NE-RB-136. Radnor, PA: USDA Forest Service, Northeast Research Station: P. 185.
- Dillman D. 2000 *Mail and internet surveys: The tailored design method*, Wiley, New York.
- Dowdy, S., and S. Wearden 1991: *Statistics for Research*. Wiley, New York pp. 1-161
- Dutra, A., Frary, J. and R. Wise 2004 Higher-order needs drive new growth in mature consumer markets. *Journal of Business Strategy* 25(5): 26-34.
- Kidd, W. 2008 *Personal Communication*: Forestry Extension Specialist (Retired) and Professor Emeritus, West Virginia University: Morgantown, WV.
- Lorenzo, A.B., and P. Beard 1996 *Factors affecting the decisions of NIPF owners to use assistance programs*. In Proc. of Symposium on Non-Industrial Private Forests: Learning from the past, prospects for the future. Minn. Ext. Serv., U. of Minn., St Paul, MN: pp. 264-275.
- Magill, D. J., McGill, D. W., and R. Fraser 2004 *Refining Outreach to Woodland Owners in West Virginia – Preferred Topics and Assistant Methods*. *J. of Extension* 42 (4):1-12.
- Mills, W.L. Jr., W.L., Hoover, S. Vassan, K.T. McNamara, and V. Nagubadi 1996 *Factors influencing participation in public management assistance programs*. In Proc. of Symposium on Non-Industrial Private Forests: Learning from the past, prospects for the future. Minn. Ext. Serv., U. of Minn., St Paul, MN: pp. 204-213.
- Net-flix, Inc. 1997 How It Works. San Jose, CA, Accessed online May 15, 2009 at <http://www.netflix.com/HowItWorks>.

AGROFORESTRY TECHNOLOGIES FOR PULP AND PAPER CONTRACT FARMERS

Brian McDonald and Ben Spong¹

Abstract--Large pulp and paper enterprises require significant supplies of woody material to keep their facilities operational. In Thailand and India, many of these companies have moved to contract farming supply programs. In these programs, the enterprise enters into contracts with local farmers for trees to be grown on their property and then sold back to the enterprise. The enterprise provides farmers with seedlings at a reduced cost and guarantees the purchase of the tree at rotation age. Many local farmers have found that these contractual plantation forestry activities are easier and more profitable than traditional agricultural activities and quickly move all of their land over to plantations. This shift in production on a very large scale can have impacts on the local supply of agricultural products and increases risk to the farmers as they become dependent on the health and security of the pulp and paper enterprise.

A comprehensive literature review of agroforestry systems is presented to describe how they integrate tree and agricultural crops and technologies to create more diverse, productive, profitable, healthy and sustainable land-use systems. Opportunities exist within the pulp and paper contract farmer system to incorporate agroforestry techniques that may improve production and profits, minimize risk, and diversify the regional ecology. This paper will discuss agroforestry technologies that can be appropriate in contract farming situations. In the Thailand and India examples, the predominantly used tree is a Eucalyptus species that is traditionally viewed as a bad tree to have mixed with agriculture crops. Farmers may require new approaches to the common agroforestry practices in order to achieve the multiple benefits through these efforts. New contract farmers often have significant experience in agricultural production, however many have little understanding of plantation forestry. To enhance the potential success of these contract agroforestry operations, small scale forestry and plantation technologies and knowledge transfer must also be integrated into the systems.

INTRODUCTION

With growing demand for wood fiber and limited commercial land to grow it on, forest industry is continually turning to private farmers and individuals to contract timber. Farmers can produce wood fiber crops in combination with agricultural products using agroforestry techniques that integrate tree and agricultural crops and technologies to create more diverse, productive, profitable, healthy and sustainable land-use systems. Opportunities exist within the pulp and

¹ Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV 26506.
ben.spong@mail.wvu.edu

paper contract farmer system to incorporate these agroforestry techniques to their contracts so that may improve production and profits, minimize risk, and diversify the regional ecology. The objective of this paper is to construct the baseline conditions with two different industrial operations in India and Thailand and identify appropriate agroforestry technologies that could be integrated into contract farming situations.

Agricultural production

India and Thailand are countries heavily dependent on agriculture, nearly sixty percent in India and forty percent in Thailand, according to the FAO. Most local farmers produce labor intensive crops, such as rice, wheat, soy, etc that are highly dependent on world markets, and often see sharp fluctuations in prices. A recent trend in agriculture is adding trees to their traditional croplands. In these agro forestry systems, farmers typically select fast growing tree species that can be harvested after only a few years and mix these with agricultural crops. Other farmers are converting all of their traditional cropland to forests due to difficult crop markets or incentives from forest products corporations.

The recent within the last two decades, increase in demand for timber, fuel wood and pulp wood has influenced farmers to convert their agricultural land to farm forestry. As land holding size continues to decline in many countries, income is increasingly sought from off farm employment. With less on-farm labor, a resulting reduction in annual crop cultivation usually occurs and new tree crops that require relatively low labor inputs, begin to gain favor (Arnold, 1987 and Stoler, 1978).

Converting all or some of a farmer's cropland to forestry has many potential benefits ranging from increased income, environmental health, and symbiotic growth of all crops through intercropping that can result in even higher realized incomes (Beer, 1987, Pruchapruth, 1996). While farmers have traditionally marketed any trees grown on their property as poles, construction timbers, scaffolding material, and other products, new opportunities are beginning to develop both local and globally for their wood fiber. Farmers now have improved access to new industries including pulp and paper, biofuels, engineered wood products, furniture, and flooring products.

Pulp and paper industries

The pulp and paper industry in India employs 200,000 people directly and indirectly supports 1,000,000 people and is nearly a \$2 billion a year industry (Lal, 2005). Historically, the paper industry in India has grown between 5 and 8 percent annually (Lal, 2005). As the global and domestic demand for paper products increases, a large strain is placed on finding and procuring the supply of wood fiber for processing. Under this situation, many pulp and paper manufacturers have turned to new cloning hybrid tree species, particularly with those from the Eucalyptus family. These new clones reduce growing time, are better suited to the region, produce higher quality fiber, have a high rate of survival, and have a much higher productivity than seed based planting (Lal, 1996,). These new advances have helped improve pulp and paper plant productivity, thus lowering the cost per unit volume of paper product.

As one of the leading pulp and paper companies in India, the Indian Tobacco Corporation, Limited, (ITC) works very closely with private farmers to grow the trees required for their mills. ITC estimates the amount of wood needed will nearly triple between 2007 and 2010. This increase will require many thousands of hectares to be planted in plantations and in land

converted from agriculture into farm forestry. In 2005, approximately 12,400 hectares were planted in cooperation with ITC and they estimated that by 2008 27,000 hectares would be planted and 100,000 by 2010. ITC, which promises buy-back of all timber, claims that traditional agriculture leads to profits between 300 dollars/hectare/year and 500 dollars/ha/yr. whereas the average net income by farmers using their clonal plantings is between 600 dollars/ha/yr and 1,000 dollars/ha/yr (ITC, 2008).

Another pulp and paper company, Siam Cement Group (SCG) was established in 1975 and since then has become Thailand's largest pulp and paper manufacturer, owning more than 50 percent of the nations market. The company is engaged in the forestry sector through the development and distribution of Eucalyptus clones. In 2004, 30.8 million seedlings were produced, and that number more than doubled in 2008 to 70.3 million. During 2007, SCG acquired 80 percent of their input from the open market, 1 percent from their own plantation and 19 percent from promoted plantations. In 2012 the company plans on sourcing its wood requirements 15 percent from the open market, 35 percent from their own plantation and 49 percent from promoted plantations which means a large increase in the amount of wood grown on private plantations.

Contract farming

Contract farming is an effective way to connect farmers who can grow wood fiber and other products and the companies that use these products. It is essentially an agreement, either formal or informal, between a company who needs an agricultural input, such as wood fiber, and a farmer who is willing to grow that product. It is an agreement that can realize both increased income for farmers and higher profitability for companies (Eaton, 2001). The terms of the contract vary, but they usually specify quantity of wood the contractor will buy, the purchase price, technical and financial assistance, and availability of improved tree sources (Baumann, 2000). Contract farming provides access to significant land bases that can support large industrial users of wood fiber that would be difficult to otherwise procure. For instance, in western Thailand, one pulp and paper company contracts with 5,000 local farmers that provide an additional 100,000 ha of forest plantations that will supply their facilities.

Benefits

There are many advantages for farmers and companies for entering into contracts to secure wood. Inputs, such as the saplings, are provided at low cost to the farmers. This arrangement provides farmers with free or low cost technical and extension services that might not otherwise be available. These inputs ensure that proper crop husbandry techniques are followed in order to achieve projected yields and required qualities for the company (Eaton, 2001). One primary benefit that corporations realize from contract farming is the ability to overcome land constraints. In areas where land tenure issues limit the amount of property a company can own or where land is not socially or economically available to purchase and manage, contract farming enables companies to secure the resource base needed for their operations.

The inability of many corporations to have large plantations leads to a need to purchase a substantial portion of pulp from the outside. This can either be done through open market purchasing, which often are not consistent sources of guaranteed quantity or quality inputs (Eaton, 2001).

Limitations

For the farmers involved in contract farming, there are also some potential limitations. When growing new crops there is a potential for market failure or crop production problems. These problems lead to increased risk for farmers, especially with longer period crops such as trees. Market risks can occur when the company's forecast of market size or price levels are not accurate (Eaton, 2001). Problems can occur for both the farmers and the companies when land tenure issues arise. Often, trees are planted on common lands where the ownership is unclear. Farmers renting land may lose rights over the longer period which trees grow. These and many other problems can lead to farmer's loss of land or loss of trees, which in turn means a loss of the income and investment in the land. However, these land tenure issues are not strictly a problem in the contract farming topic. Land tenure issues are a widespread societal problem which many farmers face. Companies need to take into consideration the social and cultural issues when implementing a new crop to an area (Eaton, 2001).

These contracts, of course, also limit to whom the farmers can sell their crops. If the farmers break the contract and sell to another company or on the open market, there are often stiff financial repercussions for the farmers. Contract farming on a very large scale can have additional impacts on the local supply of agricultural products and can increase risk to the farmers as they become dependent on the health and security of the pulp and paper enterprise.

Eucalyptus

Rapid increases in the establishment of forest plantation in Asia and the Pacific have been dominated by species of Eucalyptus (Ball, 1996). The genus Eucalyptus encompasses over 700 species, most of which occur naturally in Australia and can produce essential oils, leaf-meal, chemicals, honey, firewood, raw material for pulp, poles, etc (Kashio, 1996). Industrial planting of eucalyptus has increased, especially to produce the raw material for pulp and paper manufacturing. Eucalyptus pulp from intensively managed plantations is currently less costly than that produced from other hardwoods, and has been taking a large part of the pulp market, even displacing much softwood pulp on world markets (Davidson, 1996).

Over 13 million hectares of eucalyptus were estimated, in 1996, to be in plantations worldwide (Davidson, 1996). India alone in 1996, had 4.8 million hectares of eucalyptus plantations, which was 25 percent of their total plantation area (Davidson, 1996). Thailand in 1996 had 62,000 hectares or 8 percent of plantation land in eucalyptus (Davidson, 1996).

There has been much debate over the use of eucalyptus in the world. However, research done on eucalyptus appears to show less water use per unit weight of biomass produced than other kinds of trees and many agricultural crops, but their potentially high biomass production under low rainfall could potentially impact stream flow and ground water quantities more than slower growing plants or trees (Davidson, 1996).

Eucalyptus was introduced to India in the mid 1800s to meet firewood demands (Palanna, 1996). 170 species of eucalyptus have been tried in India, with the favorite being a hybrid of *E. tereticornis*, along with other species such as *E. grandis*, *E. citirodora*, *E. globulus* and *E. camaldulensis* (Palanna, 1996). In Thailand, eucalyptus has been grown for over 100 years, but only since 1970 on plantation scale (Pousajja, 1996). In both India and Thailand, the pulp and paper manufacturers have developed their own specific clones for increased advantages such as faster growth, disease resistance and better fiber quality.

METHODS

Given the current baseline agricultural and forest products industrial conditions in India and Thailand, agroforestry technologies can integrate eucalyptus plantations with traditional agriculture practices. Starting with a review of existing agroforestry literature, agroforestry systems were identified and assessed for their appropriateness in these conditions. Additional interviews and field observation were used to further investigate the feasibility and constraints of these systems. Data collected were then analyzed to present those systems that would provide the highest mutual benefit to both the farmers and the pulp and paper industries.

RESULTS

Growing trees together with agricultural crops has been a practice used by farmers since ancient times. The system started when foresters established forest plantations and allowed laborers to cultivate the land between trees in return for their work (King, 1987). This practice quickly became widespread from Myanmar (Burma) and India to Africa due to the simple implementation and noticeable financial returns (Nair, 1993). In the late 1800s to the mid 1900s most of the focus was on producing a tree cash crop, not on the farmer, the laborer, or agricultural outputs in the practice of the agroforestry system (King, 1987). According to Nair (1993), agroforestry became broadly accepted during the 1970s, spurring new investments and scientific investigation. During this time period, a re-assessment of agricultural development priorities by the World Bank; reexamination of forestry policies by the FAO; new interest by scientists in intercropping and farming systems; deteriorating food situation in the developing world; global energy crisis; and the research priorities in tropical forestry (Nair, 1993) all helped establish and develop the science of agroforestry.

The most widely used and accepted definition of agroforestry is that “Agroforestry is a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, etc) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. In agroforestry systems there are both ecological and economic interactions between the different components (Lundgren and Raintree, 1982).” This implies that agroforestry involves at least two species of plants, or plants and animals, one of which is a woody perennial, the system has two or more outputs, lasts more than one year and is inherently more complex than a mono-cropping system (Nair, 1993).

Agroforestry systems vary throughout the world, but are found more often in the tropical and subtropical regions than in temperate regions (Long and Nair 1999). This is due in part because of the wide variety of plants and socioeconomic situations of these regions, which require a more integrated land use system (Long and Nair, 1999). Typically, agroforestry systems are categorized based on their structural, functional, socioeconomic or ecological basis (Nair, 1993). It is common to use all of these broad classifications in describing one system of agroforestry, as they are highly interrelated (Nair, 1993). The structural classification, or composition of the components, is broken down into three main categories and is the basis for naming of agroforestry systems (Nair, 1993).

Agrosilviculture involves growing trees with other crops, silvopastoral involves growing trees combined with pasture land and agrosilvopastoral involves trees, crops and animals on the same land. In any of these combinations, trees can be grown in contract with pulp and paper companies.

Agrosilviculture

Agrosilviculture is an agroforestry practice where trees are combined with another agricultural crop species. One type of agrosilviculture is plantation crop combinations where a traditional plantation crop is under planted with another species. This practice is extremely common and has examples from all over the tropics which produce high value crops, such as oil palm, coconut and rubber with cacao, coffee, tea, cashew and black pepper (Nair, 1993).

There is a long history of debate whether or not eucalyptus can or should be used as an agroforestry species. Some have noted the high uptake of water and nutrients and the belief that some species have negative chemical effects on other species as reasons why eucalyptus cannot be planted in agroforestry systems (Sungsumarn, 1996, Patil, 1996, Raintree, 1996). The debate is frequently framed in terms of benefits and negative aspects ecologically, when the major problem actually relates to land availability, tenure and management (Turnbull, 1999). In addition, many of these “myths” of eucalyptus have been proven untrue through scientific research and field observations (Patil, 1996, White, 1996).

In India and Thailand, promoted by pulp and paper companies, eucalyptus is grown in combination with a number of crop species. These include eggplant, chilies, ginger, tomato, tobacco, cassava, pulses or fodder grasses. Typically, the eucalyptus is planted with a cash crop such as chili or tobacco since these require much light. After the first year more shade tolerant species such as ginger or fodder grass can be planted. Many of these crops have a high value and can help generate income during the initial years of tree growth. This system allows for farmers to grow the highly valued trees for sale to pulp and paper manufacturers and the other crop species for sale or domestic use.

This system has the potential to increase farmers’ income and reduce the risk involved with tree planting. Tree plantations involve upfront costs that will not be returned until the end of the growing period, in this case upwards of 5 years. Profit gained from these additional crops can help to offset the burden of waiting for the income from tree harvesting to come in. This diversification, additionally, reduces the risk by having the farmer involved in more than agricultural output.

The most common spatial arrangement is eucalyptus planted in rows with the crop planted between the rows. There are other opportunities to arrange these crops depending on the intent of the farmer. Other spatial arrangements that can be developed would be bordering, blocks, strips, etc. Border arrangements could integrate with most all potential agricultural crops on the land, with a row or multiple rows of trees around the border. This arrangement would not shade the ground as highly as other arrangements, however fewer trees would be involved and therefore less income from tree harvest. Arranging the trees in strips allows for more light to reach the other crops planted.

Silvopastoral

The silvopastoral system, as shown in Figure 1, is one where trees and animals are combined on the same parcel of land. This can be done by either introducing trees to a pasture land or bringing animals to a forested land. Planting trees on borders of farms or as windbreaks on the edge of farms has the potential to increase soil moisture by reducing sunlight and/or reducing the wind.

Either of these techniques may increase growth of plants in the field. Animals such as cattle can produce milk for consumption or for sale, increasing the income of the farmer. Manure from these animals can also add nutrients to the system. With this additional input, gains can be realized without chemical fertilizer, reducing any need for these inputs.



Figure 1. Eucalyptus and cattle silvipastoral system in India

In plantation eucalyptus systems, there is an open understory. In initial years, natural grasses grow in the area left open by the trees. In subsequent years there may be small shrubs that take over, or grasses may continue. Animals, eating the undergrowth vegetation, help to eliminate the weeds competing for nutrients and therefore improve the tree growth. However, with the addition of animals, there is a possibility of damage to trees or compaction of soils. This can reduce labor needed to manually eliminate this undergrowth. Other animals which are popular in the area, such as birds or goats have the potential to be incorporated into this system as well. These animals can produce eggs, meat or milk to be used by the household or sold at market. This will increase production of the land and can bring additional income to the farmer. This will help to diversify the farmer's income as well, through marketing of different products.

Often, the eucalyptus trees are planted on marginal lands that are otherwise unused. If this is the case, the trees have the potential to rehabilitate the land, through soil and water conservation and nutrient cycling. When this improvement in land occurs, grass species may grow in the plantation rows. This land can then be used for grazing animals on the grasses under the trees.

Agrosilvopastoral

The system of agrosilvopastoral involves planting trees in combination with crop and animal interaction. Combining trees, fodder grass and animals has the potential to increase the farmer's income and maximize the potential of the farmland. Planting fodder grass between trees can provide nutrition for animals on the site. Additional grass that is grown can be sold to feed other animals as well. One of the largest potentials this system has to offer is as a place for the landless herders who traditionally use the common lands to have access to better food sources for their animals. If the herders were willing to pay small fees for the right to feed their animals on these

lands, the farmers would see all the aforementioned benefits and the herders would have a more substantial area to feed their herds.

Planting of cash crops between rows of trees has the potential for this system as well. Most animals should be kept off the area during the growing time of these cash crops in order to avoid damage. Once the crops are harvested residue from these crops can be used as feed for cattle or other animals. This practice has the potential to be incorporated into many of the above mentioned opportunities. Nearly any tree growing scheme can have plants and/or animals added to it for increased potential benefits. Many of the benefits mentioned in the silvopastoral section also apply to this scheme.

DISCUSSION

The main role of extension and company foresters, assisting farmers considering agroforestry schemes, should be to provide necessary information required to make a decision (Glendinning et al, 2001). These outreach foresters should promote new ideas to farmers and provide technical assistance, education, and support that all for the implementation of these ideas. Many of the farmers engaged in contract farming are poorly educated and often illiterate. In a study conducted in Eastern India, one third of the farmers engaged in farm forestry could not read and more than half had less than five years education (Glendinning et al, 2001). In order to effectively work with this community outreach foresters must engage in face to face communication and assistance with farmers. It is also important for farmers to have realistic expectations and fair treatment or appropriate representation before entering into these contracts.

In the Maharashtra state of India (as well as other places), a co-operative of Eucalyptus growers was formed in order to help disseminate information on technology and training, organize supplies, make institutional and financial arrangements and market products (Patil, 1996). Groups such as these can recruit farmers interested in growing eucalyptus together for meetings with company personnel, financial officers and can allow for effective demonstration of the benefits of adopting agroforestry schemes. These co-operatives can also help farmers voice their problems, find possible solutions, interact with company personnel, and collectively bargain on behalf of the farmer co-operative.

Outreach and education priorities should be placed on assessing the productivity of the new techniques through an economic evaluation. To start this process, the costs for planting, seedlings, site preparation, harvesting, labor and others need to be collected. Also, information on revenue needs to be collected in order to assess the economic criteria for these practices. These data can be analyzed through basic economic analysis. Calculations such as net present value (NPV), internal rate of return (IRR) benefit-cost ratio (BCR) and land equivalent ratio (LER) are common methods for this analysis (Nair, 1993, Bertomeu, 2003, Arnold, 1987, Jain and Singh 2000, Niskanen, 1997).

Net present value is calculated by the difference between the sum of discounted cash flows expected from the investment and the amount initially invested. Benefit-cost ratio is the ratio of the benefits of a project relative to its costs. If the benefits are greater than costs, the project should be considered. Internal rate of return is an indicator of the efficiency or quality of an investment. The IRR for an investment is the discount rate which makes the NPV of the investment equal to zero. A project is a good investment if the IRR is greater than the rate of

return that could be realized by an alternative investment. IRR should only be used to compare more than one investment to each other as they are not mutually exclusive. LER, based on the concept of complementarity, is a ratio of the crops grown in combination to the crops grown in monocrop. All of these methods can be used to assess an investment; however the information must be presented to farmers or landowners in ways that can be understood to those unfamiliar with basic economic theory.

Future research focusing on optimal growing combinations of trees, crops and animals could provide opportunities for both farmers and contracting companies additional fiber and financial benefits. Some research has been done as to the optimal tree density and growth of some crop species under various tree crops (Singh et al, 2005, Osman et al, 1998, Niskanen, 1998, Jain and Singh, 2000, Bertomeu, 2003). However, tree and crop species specific studies need to be completed and distributed to farmers and outreach foresters. At the same time, researchers should be assessing the effectiveness of their outreach techniques and continuously improving their abilities in telling the agroforestry and contract farming story to those farmers that could most benefit from the practices.

CONCLUSION

Steady growth in the pulp and paper industry requires an increasing amount of fiber to operate. As demand increases, it becomes more difficult to find the necessary raw material due to land constraints and other factors. Contract farming can bring farmers and companies together to support the needs of the company and the farmer. The symbiotic relationship between groups provides higher incomes, improved communication and assistance between parties and allows the industry to overcome land constraints, receive higher quality inputs, and receive a scheduled quantity of materials. As farmers integrate agroforestry practices into these operations, further benefits can be realized by both groups in income and minimization of risk through the diversification of outputs.

REFERENCES

- Arnold, J.E.M. "Economic considerations in agroforestry" In *Agroforestry a decade of development*, Edited by H.A. Stepler and P.K.R. Nair. Nairobi, Kenya: ICRAF House, 1987.
- Ball, J.B. Development of Eucalyptus Plantations-An Overview. Reports Submitted to the Regional Expert Consultation on Eucalyptus. Bangkok: FAO, 1996.
- Baumann, Pari. United Kingdom. Overseas Development Institute. Equity and Efficiency in Contract Farming Schemes: The Experience of Agricultural Tree Crops. London: Overseas Development Institute, 2000.
- Beer, John. "Advantages, disadvantages and desirable characteristics of shade trees for coffee, cacao and tea." Agroforestry Systems 5(1987): 3-13.
- Bertomeu, Manuel G. Smallholder maize-timber agroforestry systems in Northern Mindanao, Philippines: Profitability and contribution to the timber industry sector. The International Conference on Rural Livelihoods, Forests and Biodiversity, Bonn, Germany. Bonn, Germany: 2003.
- Davidson, John. Ecological Aspects of Eucalyptus Plantations. Reports Submitted to the Regional Expert Consultation on Eucalyptus. Bangkok: FAO, 1996.
- Eaton, C., and A.W. Shepherd. Contract Farming: Partnerships for Growth. Rome: FAO, 2001.

- Glendinning, Anthony, Ajay Mahapatra, C. Paul Mitchell. "Modes of Communication and Effectiveness of Agroforestry Extension in Eastern India." Human Ecology 29(2001): 283-305.
- ITC Limited. Paperboards and Specialty Papers Division. Making Nature and People smile. Bhadrachalam: 2007
- Jain, S.K., P. Singh. "Economic analysis of industrial agroforestry: poplar (*Populus deltoides*) in Uttar Pradesh (India)." Agroforestry Systems 49(2000): 255-273.
- Kashio, M. A Regional Overview of Eucalyptus Planting and the Scope of the Present Consultation-Based on the Presented Papers. Reports Submitted to the Regional Expert Consultation on Eucalyptus. Bangkok: FAO, 1996.
- King, K.F.S. "The History of Agroforestry" In *Agroforestry a decade of development*, Edited by H.A. Stepler and P.K.R. Nair. Nairobi, Kenya: ICRAF House, 1987.
- Lal, Piare. "Integrated Development of Agroforestry Plantations and Wood Based Industries" in *Agroforestry In 21st Century*, Edited by S.K. Chauhan, S.S. Gill, S.C. Sharma and R. Chauhan. New Delhi, India: S.S.S. Printers, 2005.
- Long, Alan J., and P.K.R. Nair. "Trees Outside Forests: agro-, community, and urban forestry." New Forests 17(1999): 145-174.
- Lundgren, B.O. and J. B. Raintree. "Sustained Agroforestry" in *Agricultural Research for Development: Potentials and Challenges in Asia*. ISNAR, The Hague, The Netherlands. 1982.
- Nair, P.K.R. An Introduction to Agroforestry. Dordrecht, The Netherlands: Kluwer; ICRAF, 1993.
- Niskanen, Anssi. "Financial and economic profitability of reforestation in Thailand." Forest Ecology and Management 104(1998): 57-68.
- Osman, M., W.H. Emmingham, S.H. Sharrow. "Growth and yield of sorghum or cowpea in an agrisilviculture system in semiarid India." Agroforestry Systems 42(1998): 91-105.
- Palanna, R.M. Eucalyptus in India. Reports Submitted to the Regional Expert Consultation on Eucalyptus. Bangkok: FAO, 1996.
- Patil, Vinayakrao. Local Communities and Eucalyptus-An Experience in India. Reports Submitted to the Regional Expert Consultation on Eucalyptus. Bangkok: FAO, 1996.
- Pousajja, Reungchai. Eucalyptus Plantations in Thailand. Reports Submitted to the Regional Expert Consultation on Eucalyptus. Bangkok: FAO, 1996.
- Pruchapruth, Suthenun. The Role of Eucalyptus-Current Problems in Thailand. Reports Submitted to the Regional Expert Consultation on Eucalyptus. Bangkok: FAO, 1996.
- Raintree, John B. The Great Eucalyptus Debate: What is it Really All About. Reports Submitted to the Regional Expert Consultation on Eucalyptus. Bangkok: FAO, 1996.
- Singh, Harinder., N. Singh, G. Singh. "Forage Yield and Quality of Guinea Grass (*Panicum maximum*) and Cowpeas (*Vigna unguiculata*) in Association with Important Agroforestry Tree Species" in *Agroforestry In 21st Century*, Edited by S.K. Chauhan, S.S. Gill, S.C. Sharma and R. Chauhan. New Delhi, India: S.S.S. Printers, 2005.
- Stoler, A. Garden use and household economy in rural Java. *Bulletin of Indonesian Studies* 14:85-101. 1978
- Sungsumarn, Komain Why Eucalyptus is Not Adopted for Agroforestry. Reports Submitted to the Regional Expert Consultation on Eucalyptus. Bangkok: FAO, 1996.

Turnbull, John W. "Eucalypt plantations." New Forests 17(1999): 37-52.

White, K.J. Silviculture of Eucalyptus Plantings-Learning in the Region. Reports Submitted to the Regional Expert Consultation on Eucalyptus. Bangkok: FAO, 1996.

TIMBER HARVESTING ON SLOVENIAN FAMILY FARMS

Mirko Medved¹

Abstract--Timber harvesting is an integral part of the family farm economy. Nearly a third of 1.2 million ha of forests in Slovenia are owned by family farms. The average forest property (5.6 ha) owned by family farms is three times larger than non-farm family forests. The hypothesis is that the societal development impact is also reflected in forest management and use of wood. Forest management has been monitored by the Statistical Office of the Republic of Slovenia: the 2000 census and sample surveys in 2003, 2005 and 2007. On average 50,000 family farms (70% of those with forests) provided information on annual harvesting activities. Between the years 2000 to 2007, total felling increased by 21% from 1.29 million m³ to 1.56 million m³. Average family farm felling increased from 25.0 m³ to 32.6 m³ and on per-area basis from 3.27 m³/ha/year to 4.11 m³/ha/year in the same period. Approximately 60% of wood was used for domestic purposes on farms. The use of wood for energy purposes oscillated between 55% and 62%. A combined approach of using forestry data and research into farm economies is an objective instrument for the study of long-term trends as well as a pertinent analytical tool for directing private forest management, forest planning, and forestry policy.

INTRODUCTION

Timber harvesting is an integral part of the family farm economy. Nearly a third of all forests in Slovenia (total forest area 1.2 million ha) are owned by family farms. The average forest property owned by family farms is three times larger (5.6 ha) than non-farm family forests. Owing to the general deagrarianisation trends in our society, however, the number of family farms has been reduced. In the 2000-2007 period, the number of family farms fell from 86,000 to 75,000. According to the data presented by the Statistical Office of the Republic of Slovenia, 11% of family farms contain no forests at all. There are some 300,000 privately owned family estates in the country.

Slovenia is known as a woody country with more than 60% of area covered by forests, with average timber-growing stock of more than 300 m³/ha. In the last 60 years, the status of forests has significantly improved, both from the aspect of timber-growing stock and the tree species structure, which favours deciduous trees and natural structures of forest stands.

In the 1981-1985 period, 1.84 million m³ (54%) of wood was removed annual from privately owned forests of the total volume of cut trees (Winkler and Gašperšič 1987). Of this, 1.19 million m³ (65%) was sold, while 0.65 million m³ was intended for domestic consumption. The intensity of felling reached 2.81 m³/ha/year (63% of average annual growth).

By 2007, the official data show that 2.06 million m³ of timber gross (63% of the total volume of cut trees) (Slovenia Forest Service report for 2007) was cut in privately owned forests. The total

¹ Slovenian Forestry Institute, Vecna pot 2, 1000 Ljubljana, Slovenia, email: mirko.medved@gozdis.si

market output from privately owned forests is not known. The intensity of felling was 2.39 m³/ha/year, or 36% of the average annual growth of all forests in Slovenia).

The main objective of our study is to present the results of research into family farms in order to analyse timber harvesting trends after 2000. Some of the trends will be additionally compared with the survey from 1995 (Medved 2000). Owing to the methodological differences in defining the status of family farms, the results are not fully comparable, although they are no doubt a significant indicator as far as timber harvesting trends are concerned.

In the present paper, forests belonging to family farms are being studied to test the following hypotheses:

- *forests constitute an integral part of a farm and are highly pertinent from the aspect of regular income as well as long-term financial reserves (a “bank”)*
- *forests are a significant source of a permanent wood energy supply*
- *socio-economical conditions in the society have an impact on the intensity of forest management*

Development of private property after World War II

The constant changes that take place in the society bring about new socio-economic relations and a new social structure in its population. After World War II, the once predominantly farm and large estate forests in Slovenia underwent some great changes in their property structure. Those that were owned by big landowners prior to the war were fully nationalised, as were those that belonged to farmers and covered more than 45 ha, and other private forests that covered more than 5 ha. In 1991, when Slovenia 1991 gained its independence, a democratic social system was introduced and the Government adopted legislation on de-nationalisation, which did not heed the social status of private owners. The same rights of all descendants from inheritance law and evidence of citizenship at the time of de-nationalisation were taken in consideration.

In contrast to other Eastern European countries, agricultural land and forests were mostly privately owned in Slovenia during the period of socialism. In 1980, when farmers owned three fourth of forests and constituted 60% of all owners, some 650,000 ha of forests were in private hands. In 1991, the de-nationalisation law was passed that enabled property, which was taken away from farmers and other family forest owners, various agrarian communities, big landowners and the Church immediately after the war, to be given back to them. The effects of this law are today reflected in the increased diversity of private forest ownerships, in the increased surface area of the forests, and the greatly increased number of (co)ownership relations due to the transfer of property rights to all eligible successors.

Table 1. Development of forest area and ownership structure in the last six decades

Year	Forest area (000 ha)	Family farm forests (%)	Other private forests (%)	State forests (%)
1951	900	64	3	33
1985	1,056	37	25	38
2010*	1,253	30	46	24

* Global Forest Resources Assessment, 2010 estimation

Between 1951 and 2010* the total forest area increased by 39%; officially, there are still almost as many state forests in Slovenia as prior to 1991, but the fact is that one third of them are categorised as protected forests. After denationalisation is complete, however, only about 20% of forest area will be state owned. The area of farm forests has been practically halved, while the area of non-farm private forests is 18 times greater, already reaching over 0.58 million ha. This was mostly contributed by the rapid industrial development three decades ago as well as by the denationalisation law in the previous decade.

We were able to assess (Medved 2003) the ownership structure of non-farm forest property at the turn of the millennium (Table 2) from the difference in the data of forest management plans regarding the ownership structure of all privately owned forests and the census of family farms. There are no statistics about social status of privately owned forests in forest management plans. Figures were given only for complete private ownership structure. Census of family farms gives opportunity to find out the difference from total what present other private estates.

Table 2. Ownership structure of privately owned family forests in 2000 as a percentage of total

Property size	----Structure of estates (No.)----		-Structure of forest surface area-	
	Family farms (%)	Other private estates (%)	Family farms (%)	Other private estates (%)
Up to 1 ha	24.2	74.8	2.6	25.7
1 - 5 ha	46.1	21.6	23.4	31.6
5 - 30 ha	27.9	3.4	58.0	29.8
Over 30 ha	1.8	0.2	16.0	12.9
Total	100.0	100.0	100.0	100.0

Although the property structure is somewhat dated, it still shows that the non-farm forest properties have nearly equal proportions represented in terms of the surface area in forest, but the distribution of the number of owners is skewed and most of the owners possess smaller properties. Most of the family farms are situated in the 5- 30 ha class.

METHODS

Agricultural economy census (hereinafter referred to as “agriculture census”) is a basic statistical research method designed for the collection of data on the status and development trends in the agricultural sector. It is also recommended by FAO and carried out on with its guidance by numerous countries all over the world. In EU-member states, the census is prescribed by law and implemented every ten years. Basic data on land, socio-economic and production structure, as well as on technological provision of agricultural economies (Dernulc 2002) are collected.

The following definitions will be used throughout text: **Agricultural economy** is an organizationally and commercially discrete entity of agricultural plots of land, forests, buildings, equipment, and labour resources. It deals with agricultural production and has a uniform management. **Agricultural firms** are companies and cooperative societies, which have been entered in the register of firms, and carry out various agricultural activities. **Family farms** are all other agricultural economies that meet the criterion (property size, income sources) of a Europe-comparable farm. The definition of a socio-economic category “family farm” began to be strictly

used in Slovenia with implementation of the 2000 census. Definitions and classifications were in compliance with European Statistical Office recommendations. Europe comparable farm have to manage: at least 1 hectare of utilised agricultural area, or less than 1 hectare of utilised agricultural area, but at least 0.1 hectare of utilised agricultural area and 0.9 hectare of forest, or at least 0.3 hectare of vineyards and/or orchards, or 2 or more livestock units, or 0.15 to 0.3 hectare of vineyards and 1 or 2 livestock units, or more than 50 beehives, or are market producers of vegetables (Dernulc 2002).

In the 1970s, as well as earlier, private forest owners were labelled as “farmers” and “non-farmers”, where the basis for distinction was the source of income. In the 1980s, differentiation of socio-economic types (Kovačič 1983) was developed, by which the terms “pure farm”, “mixed farm”, “supplemental farm” and “old farm” were introduced. The socio-economic type of farm shows from which sources farm households get their income and the employment status of their members. After 1991, when Slovenia attained its independence, and in the years after, when it gradually began to adopt European agricultural policies, the term “Europe-comparable” farm was introduced.

After World War II, a forest inventory was implemented (reprint UL BF 2007), while at the beginning of the 1960s (Lavric 1953), an extensive research into wood use with a special emphasis on its home utilisation was carried out. In 1985, a survey analysis was made that enabled use of some of the above stated indicators (Winkler and Gaspersic 1987). In 1990 and 1995, forest owners throughout Slovenia were sampled using a questionnaire (n < 1,000, stratified according to the property size classes) (Medved 1991, Medved and Winkler 1995, Medved 2000), from which additional indicators can be obtained. The only problem is the reliability of the total population estimator of forest owners, owing to the unreliable data on the actual population structure.

Statistical research into the structure of agricultural economies is one of the basic statistical inquiries into the sphere of agriculture (Dernulc 2002). Data are gathered on land use, number of livestock, workforce in agriculture, agricultural and forest mechanisation, supplemental activities, and on forestry in agricultural economies. The research includes all the Europe-comparable farm economies. In compliance with EU legislation, the research is carried out every ten years as census, while in between, during the years stipulated by law, it can be carried out as sample research. The next agricultural economy census is planned for 2010.

Since 2000, forest management and felling have been systematically monitored within the framework of the research carried out by the Statistical Office of the Republic of Slovenia (agricultural economy census in 2000 (Dernulc 2002), and sample surveys of agricultural economies (n approx. 15,000) in 2003, 2005 and 2007). On the basis of our endeavours and proposal, a forestry chapter was added in 2000 to the national agriculture surveys.

Together with EU legislation, a list of compulsory variables is prescribed as part of the data gathering methodology, in order to make research results comparable among all EU member states. The chapter on forestry is not a compulsory part of EU requirements, but was added and methodologically defined in Slovenia on the basis of our preliminary research carried out in 1990 and 1995.

Within the forestry framework, felling data for both coniferous and deciduous trees (net cubic metres) and data on forest mechanisation and equipment are gathered in addition to data on forest surface areas and forest labour and machinery. For the sample research carried out in 2003, 2005 and 2007, the 95% confidence interval for population parameters was calculated as well. All basic data were provided by Statistical Office of the Republic of Slovenia and calculated for the paper by the author.

RESULTS

The trends in timber harvesting intensity are shown with various indicators in the tables below. These tables also include assessments for population parameters at 95% confidence interval. The interval assessments are given in absolute units of deviation from the population estimator and in relative relations.

Felling frequency on family farms

Felling frequency can be expressed as the total number of forest owners felling their trees and as the proportion of owners by whom felling is carried out during separate years (interval period of 12 months prior to the research from June 1st in the year prior to the research till May 31st in the year of research).

Table 3. Number of family farms (FF) with tree felling activities

Year of research	No. of FF	No. of FF with cutting	95% Confidence Interval		Share of FF with cutting (%)	Interval assessm. FF with cutting (%)
			Lower limit	Upper limit		
2000	76,653	51,571	<i>Census</i>		67.3	<i>Census</i>
2003	68,644	46,909	46,150	47,667	68.3	+/- 1.62
2005	68,913	50,480	49,806	51,154	73.3	+/- 1.33
2007	67,138	47,713	47,030	48,397	71.1	+/- 1.43

Within the framework of research carried out by Statistical Office of the Republic of Slovenia, 76,653 family farms were included in the 2000 census. Felling had been carried out during the yearly period prior to the research by a good two thirds of them (67.3%). In the ensuing studies, the number of farms with harvesting activities decreased on the one hand, but increased proportionally on the other. According to the research, felling was carried out by the highest proportion of farms in 2005, i.e. 73.3%. The assessment reliability at 5% risk is relatively great, reaching in that particular year +/- 674 family farms or 1.33%. The interval assessment is also low for the years 2007 (1.43%) and 2003 (1.62%), indicating a relatively small variability in the number of farms that opted for felling in the given reference period of 12 months prior to the research.

Table 4. Quantity of wood felled during the 2000-2007 period

Year of research	Quantity of felled wood FF (m ³)	No. of FF with cutting	Average felling per FF (m ³)	95% Confidence Interval (+/- m ³)	95% Confidence Interval (+/- %)
2000	1,286,868	51,571	25.0	Census	
2003	1,316,431	46,909	28.1	49,838	3.79
2005	1,423,074	50,480	28.2	40,374	2.84
2007	1,557,151	47,713	32.6	117,070	7.52
---Relative relations, year 2001 = 1.00---					
2000	1.00	1.00	1.00		
2003	1.02	0.91	1.12		
2005	1.11	0.98	1.13		
2007	1.21	0.93	1.30		

Total felling

From 2000 to 2007, the family farms' total felling increased by the 21%. Felling increased relatively slowly until 2003. From 2003 to 2007, timber harvesting on family farms increased on average by 5% per year. At the same time, the number of farms was reduced by the 7%, notably in the last two years. Owing to the inversely proportional trends in the quantity of felled wood and in the number of family farms with tree felling activities, the average felling per farm increased by 30%. Up until 2005, the increase in harvesting was relatively regular, but then increased significantly in the last two years by 17%. In seven years, the average volumes in family farm fellings increased from 25 m³ to 32.6 m³. For 2003 and 2005, the felling interval reliability assessment is relatively low (2.84% and 3.79% respectively), making the felling assessment at 95% risk fairly reliable within +/- 50,000 m³. For 2007, the total felling assessment is less reliable (+/- 117,000 m³ or +/- 7.52%) owing to the greatly increased felling of conifers, as indicated in the next chapter.

Felling structure per tree species and purpose of use

In the studied period, the structure of felling with regard to different groups of tree species changed as well (Table 5). Total felling increased by 21%. Felling of deciduous trees increased by 7% and by 47% in conifers compared with base year 2000. In the last reference period, the total felling of conifers in 2007 was greater by 213,000 m³, and only by 57,000 m³ in deciduous trees compared with the year 2000. In 2005 and 2007, conifers were felled in Slovenia to a much greater extent owing to the bark beetle (*Ips sp.*) outbreak (Report by Slovenia Forest Service 2008) The harvesting in beetle-infested coniferous forests is probably also the main reason for the greatly increased felling of trees on family farms. The great disproportions in the felling per

separate farms are also reflected in the high interval assessment for 2007, which is no less than +/- 101,000 m³. For deciduous trees, the interval assessment is relatively low and similar during all years of research, and at least by 2.7 times lower than for conifers.

Table 5. Quantity of felled wood per different tree species

Year of research	Quantity of felled wood FF (m ³)	Felled conifers (m ³)	Felled deciduous trees (m ³)	95% Confidence Interval Con. (%)	95% Confidence Interval Dec. (%)
2000	1,286,868	452,822	834,046	Census	
2003	1,316,431	460,075	856,356	8.35	2.94
2005	1,423,074	528,345	894,729	5.70	2.12
2007	1,557,151	665,972	891,179	15.19	3.53
---Relative relations, year 2001 = 1.00---					
2000	1.00	1.00	1.00		
2003	1.02	1.02	1.03		
2005	1.11	1.17	1.07		
2007	1.21	1.47	1.07		

Variability is much lower in view of the number of family farms (with harvesting activities) than in the quantity of felled wood. In deciduous trees it oscillates only between 1.46% and 1.73 %, while in conifers it is slightly higher, i.e. from 3.27% to 3.83% (Table 6).

Table 6. Number of family farms and felling per different tree species

Year of research	No. of FF with cutting (n)	Felled conifers (n)	Felled deciduous trees (n)	Interval assessment Con. (%)	Interval assessment Dec. (%)
2000	51,571	17,037	47,848	Census	
2003	46,909	15,290	44,686	3.83	1.73
2005	50,480	16,929	47,484	3.30	1.46
2007	47,713	17,212	44,288	3.27	1.59
---Relative relations, year 2001 = 1.00---					
2000	1.00	1.00	1.00		
2003	0.91	0.90	0.93		
2005	0.98	0.99	0.99		
2007	0.93	1.01	0.93		

Within the framework of felling structure, the felling of wood intended by family farms for energy purposes (Table 7) was analysed. The greatest increase was recorded in 2005, when the quantity of felled wood was greater by almost 145,000 m³.

In 2007, the total quantity of wood cut for energy purposes was decreased as far as deciduous trees are concerned, while in conifers the increasing trend continued, in fact, in 2007, some 60%

more wood was cut than in 2000. In deciduous trees, a 12% increase was registered in the same period. For deciduous trees, the interval assessments are substantially lower than for conifers, which means that in the felling of conifers for energy purposes the variability is greater.

Table 7. Quantities of wood felled for energy purposes in view of different tree species

Year of research	Quantities of felled wood FF (m3)	Felled conifers (m3)	Felled deciduous trees (m3)	95% Confidence Interval Con. (%)	95% Confidence Interval Dec. (%)
2000	731,348	62,574	668,774	Census	
2003	792,521	59,275	733,247	6.02	2.47
2005	877,240	85,150	792,259	8.00	1.82
2007	850,518	99,871	750,647	6.24	2.18
<i>---Relative relations, year 2001 = 1.00---</i>					
2000	1.00	1.00	1.00		
2003	1.08	0.95	1.10		
2005	1.20	1.36	1.18		
2007	1.16	1.60	1.12		

Irrespective of the 16% increase in the quantities of wood felled for energy purposes, the number of family farms slightly decreased. The number of family farms, where conifers are also felled for energy purposes, increased by 20%. The reliability of population estimates is here greater, the same as in the case of wood quantities, in the felling of deciduous trees than in the felling of conifers (Table 8).

Table 8. Number of family farms and felling for energy purposes in view of different tree species

Year of research	No. of FF with cutting (n)	Felled conifers (n)	Felled deciduous trees (n)	95% Confidence Interval Con. (%)	95% Confidence Interval Dec. (%)
2000	48,478	7,362	46,153	Census	
2003	44,603	7,437	43,327	5.91	1.79
2005	48,434	8,344	46,240	5.23	1.51
2007	45,119	8,864	42,617	5.04	1.66
<i>---Relative relations, year 2001 = 1.00---</i>					
2000	1.00	1.00	1.00		
2003	0.92	1.01	0.94		
2005	1.00	1.13	1.00		
2007	0.93	1.20	0.92		

In the total cut structure, shares of wood by product class were analysed. Owing to the high quantities of conifers felled in 2007, the use of roundwood for primary processing was increased to 40.2%. The use of roundwood for energy purposes was the greatest in 2005 (61.5%) (Table 9).

Table 9. Structure of felled wood in view of the main purpose of its use (%)

Year of research	Total cut	Wood for energy	Sawnwood	Other wood
2000	100.0	56.8	36.5	6.7
2003	100.0	60.2	34.0	5.8
2005	100.0	61.6	33.6	4.8
2007	100.0	54.6	40.2	5.2

The analysis of sale and domestic use of wood structure (Table 10) has shown that the relations were very similar in the first three researches (sale 37.5% +/- 0.7%), whereas in the last, the share of its sale rose characteristically (44%). The reason lay mainly in the increased quantities of cut coniferous trees. For the year 2007, separate assortment groups are marked by the following increase compared with the year 2000:

- *Wood for energy purposes – conifers (quotient 2.69)*
- *Log-wood conifers (quotient 1.64)*
- *Wood for energy purposes – deciduous trees (quotient 1.58)*

Table 10. Structure of felling for commercial and domestic use

Year of research	Total cut	-----Share in %-----		--Growth index (2000 = 1)--	
		Wood for sale	Wood for domestic use	Wood for sale	Wood for domestic use
2000	100.0	38.2	61.8	1.00	1.00
2003	100.0	36.9	63.1	0.99	1.05
2005	100.0	37.1	62.9	1.07	1.13
2007	100.0	44.0	56.0	1.39	1.10

Forest management intensity - felling quantities per forest surface area

For forest management intensity, quantities of wood felled in view of different size categories of property were analysed according to the same classes as in Table 2, except that the 5 to 30 ha class was divided additionally. Figure 1 shows quantities of wood cut per 1 ha area unit for all four years of research from the year 2000 to 2005, with added average values of all results and their interval (+/- 20%).

The felling intensity was the greatest on the smallest estates, where it most probably already surpassed the forests' growth increment capacities. In spite of that, we have to stress that on smaller estates the majority of wood is used for energy purposes, which is the reason why thinner wood and branches are used as well, contributing to a higher yield of gross quantities of wood harvested. In the property categories higher than 5 ha, the average cut is fairly similar, on average reaching about 3 m³/ha. In the last year of research, however, almost all values were above-average, which is the reason why total felling average reached slightly more than 4 m³/ha for the year 2007.

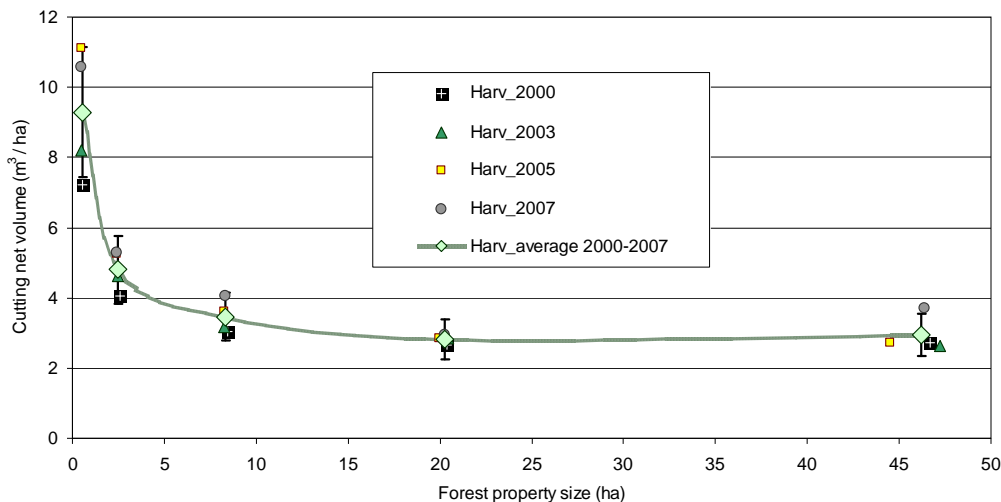


Figure 1. Intensity of timber harvesting and forest property size (interval is +/- 20% of the average value)

Forest management intensity – share of farms with cutting

The cutting frequency data were also compared with those obtained during the research carried out in 1990 and 1995. It was established that the frequency of cutting on pure and mixed farms were fully comparable with the frequency on family farms from 2000 onwards. The year 1990 is not presented, but merely the data on the average cutting in supplementary, senior and non-farm estates (S&S&NF_1995 in Figure 2). It can now be concluded that the frequency of timber harvesting activities on those forests is almost by half lower than on family farms. As far as non-farm households are concerned, members opted for cutting approximately twice to three times in 10 year period where the size of property played no substantial role. Figure 2 shows how often farms engaged in annual harvesting activity according to different studies and forestry property size categories. The bigger the properties, the more active are family farms in forests (Ft&PtF_1995 – Full-time & Part-time Farm).

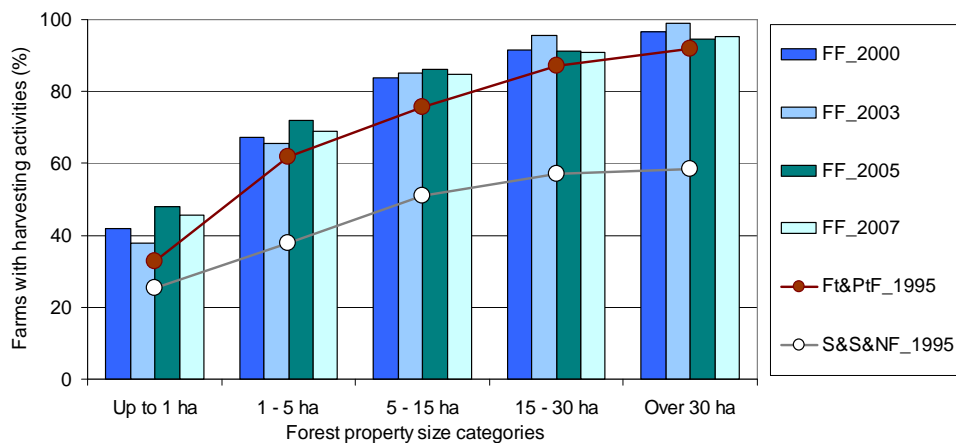


Figure 2. Tree felling frequencies on farms

DISCUSSION

Farmers often combine several professions and are thus farmers, stock-breeders, fruit-growers, and foresters, but began to lag behind in the fast-paced development, and gradually divested themselves of production. The result of this state of affairs is also the social-proprietary structure of forests in Slovenia. Around 1950, during socialism, the Slovenian farmers indeed owned almost two thirds of the forests, but had limited rights as far as forest management and utilization of wood were concerned. In the year 2009, farmers own much less than one third of the forestland. During this time, forests also increased by more than 0.3 million ha or by 15% of the entire surface area of the country.

Forest management has been subjected to these trends in Slovenia and it has been, according to official data, greatly de-intensified. The degree of current increment felling has been almost halved. The wealth of Slovenian forests is therefore strengthening on the one hand, while records of felling are often underestimated in comparison with factual data owing to certain deficiencies in the abilities to monitor felling activity.

The research carried out into farm economies as well as detailed analyses of the felling in family farms' forests show a different picture as far as management intensity is concerned. Since 2000, the cut has increased from 3.27 m³/ha to 4.11 m³/ha in 2007. These figures are much higher than official data. The increased cut has been contributed by rising prices of other energy sources and the calamities raging in our forests during the 2005-2007 period.

The great differences between the growth rate and the cut in our forests are the result of the past forest management plans to increase the growing stock. Here, favourable conditions in the sphere of energy production have to be also mentioned, considering that in the entire human history fossil fuels supply was most favourable and plentiful in this very period.

Wood cutting reflects the farms' needs for wood for domestic consumption as well as needs to provide for direct income from forests through the sale of wood. A significant result has been attained by the analyses of wood consumption in view of different size categories of forest property, which indicate structural differences between these categories as well as needs for different approaches in stimulating the intensity of timber harvesting. To a farmer, the forest is still a long-term financial reserve, which is also shown by (on average) lower cut than growth increment.

The exceptionally high share of wood used by farmers for heating purposes shows that this is the cheapest source of energy for them. The use is relatively constant irrespective of the size of forest property. This is why in the lowest property categories of up to 5 ha, the greater part of wood is used for heating.

The data independently gathered within the framework of farm economy census have an important role in systematic monitoring of timber harvesting trends in private forests. However, the non-farm forests still remain a mystery in comparison with the forests owned by family farms. The data collected through the research into family farms are an extremely important expedient in the making of accounts for forestry at the national level, considering that data on the employment of family members in forestry, hire of labour and machinery, and mechanization equipment are obtained within the framework of this research as well.

A combined study of forestry data and research into farm economies is an objective instrument for the study of long-term trends as well as a pertinent analytical tool for directing private forest management, forest planning, and forestry policy.

REFERENCES

- Dernulc, S., 2002. Popis kmetijskih gospodarstev (Agricultural census), Slovenija, 2000.- Ljubljana, Statistični urad Republike Slovenije.
- Dernulc, S., 2001-2009. Podatki popisa kmetijskih gospodarstev 2000 in statističnih raziskav 2003, 2005, 2007, Statistični urad Republike Slovenije
- Kovačič, M. 1983. Tipi kmetij v Sloveniji in njihove značilnosti. Raziskave in študije, Ljubljana, Kmetijski inštitut Slovenije, 63, 73 s.
- Kovačič, M., 1994. Velikostna struktura slovenskih kmetij.- V: Kako izboljšati posestno strukturo v Sloveniji, IX. posvet kmetijsko svetovalne službe, Bled, Republiška uprava za pospeševanje kmetijstva, s. 17-27.
- Lavrič, J. 1953. Izkoriščanje gozdov in anketa o potrošnji lesa v LR Sloveniji 1951. Zavod za statistiko in evidenco LR Slovenije.
- Medved, M., 1991. Vključevanje lastnikov gozdov v gozdno proizvodnjo.- Ljubljana, Univerza v Ljubljani, VDO Biotehniška fakulteta, VTOZD Gozdarstvo.
- Medved, M. 2000. Gozdnogospodarske posledice posestne sestave slovenskih zasebnih gozdov.- Ljubljana, Univerza v Ljubljani, Biotehniška fakulteta, Oddelek za gozdarstvo in obnovljive gozdne vire.
- Medved, M. 2003. Posestne razmere in pridobivanje lesa v gozdovih.- Gozdarski vestnik, 61:347-359.
- SURS 2004 Metodološka pojasnila za Raziskovanje strukture kmetijskih gospodarstev. SURS, 2004, <http://www.stat.si/>, 27. 1. 2005
- Udovč, A., Kovačič, M., Kramarič, F., 2009, Socio-ekonomski tipi kmetij po podatkih Popisa kmetijskih gospodarstev v letu 2000, www.stat.si/doc/sosvet/sosvet_08/sos08_s345-2005.doc (10. 4. 2009)
- Winkler, I. / Gašperšič, F., 1987. Zasebni gozdovi v Sloveniji - stanje in novejša gibanja.- Ljubljana, Univerza v Ljubljani, Biotehniška fakulteta, VTOZD za gozdarstvo, Inštitut za gozdno in lesno gospodarstvo.
- Inventarizacija gozdov 1946 in 1947, UL BFG, Ponatis, Ljubljana 2007.
- Poročilo Zavoda za gozdove Slovenije o gozdovih za leto 2007, Zavod za gozdove Slovenije, Ljubljana, April 2008.
- Global Forest Resources Assessment 2010 (GFRA), Slovenia Country Report, Working version, April 2009
- Struktura kmetijskih gospodarstev, http://www.stat.si/novice_poglej.asp?ID=253, (April 2009)

SMALL SCALE AND AMENITY FOCUSED FORESTRY: FILLING A MARKET NICHE

Katie L. Nelson¹ and R. Bruce Hull²

Abstract-- Urbanization, changing forest landowner values, and restructuring forest industry are creating challenges for the active management of small parcels of forestland. Many traditional service providers are reluctant to service small acreage parcels due to economies of scale, shrinking profit margins for unprocessed stumpage, and landowner expectations of more than timber revenue. New, amenity-oriented landowners do not understand traditional forestry operations, and do not know where to look for service providers. A gap in our nation's forest system has emerged, and many fragmented forested acres are being ignored, exploited, or converted to other uses because traditional forestry no longer fits. This creates a new market opportunity for service providers willing to work with small scale forest landowners. In this study, over fifty small scale forest service providers were interviewed to determine how their business is structured, how they charge for the services they provide, and how successful they perceive themselves to be. In addition, about 15 public-forest professionals from state and federal agencies, environmental groups, land trusts, and NGOs were interviewed to determine how they and their programs are changing in response to emerging conditions.

We found that successful service providers generally charge by some measure of time and materials rather than by commission. Other common attributes of successful small scale forestry operations included willingness to diversify their business to offer a bundle of services, and to work with professionals in related industries. Value-added processing and creative marketing assist service providers in achieving a profit from small-scale tracts with traditionally low-value products.

INTRODUCTION

Trends in land parcelization and fragmentation, timber markets, community composition, and societal values are making it difficult for traditional forestry service providers to operate and are creating opportunities for entrepreneurs. This study attempts to extract lessons learned by innovative service providers targeting the changed context.

LITERATURE REVIEW

The literature highlights trends in land use, the forest industry, land management, and public forestry that make traditional forest management difficult.

¹ College of Natural Resources, Virginia Tech (knels07@vt.edu)

² College of Natural Resources, Virginia Tech

Land Use Trends

Urbanization is occurring rapidly, and urban and exurban areas now cover 4 to 5 times the area they did in 1950; as of 2000 approximately 30% of private land in the US had a structure every 40 acres (Brown *et al.* 2005). Between 1980 and 2000, the population of the United States increased by 24 percent, but the amount of land devoted to urban and built-up use increased by 34 percent; populations are spreading out as they grow (Alig *et al.* 2004). One of the impacts from urbanization will be a smaller rural land base, changing land use patterns within that land base (Alig *et al.* 2004) and increased pressures to fragment further because of higher land values and property taxes (Wear and Newman, 2004). Some suggest that 12 million acres will be lost by the year 2020 (Wear and Newman, 2004), making it the single most substantial threat to forest sustainability in the southern United States (Wear and Greis, 2002). With urbanization and parcelization come decreasing economies of scale, especially for tracts below 25 acres. Sampson and DeCoster (2000) call tracts of this size “too large to ignore and too small to manage as a sustainable unit.” This makes sustainable forest land management difficult even for people with a desire to manage their land. The forest industry is adapting to smaller wood lot sizes, although they eventually become so small that forest management, or even a one time harvest, cannot be justified (Germain *et al.* 2007).

Yet these forests remain in need of management, in part because of ecosystem fragmentation. They are threatened by invasive species and disease such as gypsy moth, ash boarers, kudzu, and oak wilt. Climate change is altering where species thrive, when they pollinate and hibernate, and how they interact with other species. Soil compaction, salination, and altered water tables stress forest health and tree function. As average parcel size decreases both the quantity and quality of timber growing on these lands decreases (Munsell *et al.* 2007; Germain *et al.* 2007).

Forest Industry Trends

Changes in timber markets make forest management difficult for landowners. Wear, Carter, and Prestemon (2007) note that capacity to accept pulpwood in the south decreased by about 16 percent between 1998 and 2003. World demand for paper products is being met in locations such as South America with a competitive advantage in costs of labor and raw materials. Demand for small diameter, less expensive timber is increasing compared to demand for veneer logs (Wear, Carter, and Prestemon, 2007).

Decreasing or slowly growing demand for wood products overall, increasing demand for smaller, cheaper logs relative to larger, more valuable logs, the increasing importance of non-wood sources of fiber, and the increasing availability of maturing plantation timber are forces that are combining to decrease the profits forest landowners receive from timber management (Wear, Carter, and Prestemon, 2007). Many small acre woodlots are going unmanaged at this point because low timber prices and higher operating expenses make it difficult to harvest profitably (Wear and Greis, 2002). These trends are likely to continue. Oliver and Mesznik (2005) state that since the global wood supply is greater than demand, investment in forestry will only be profitable for wood with below-average planting and harvesting costs, locations with lower transportation costs, high quality common woods, or highly-prized rare woods.

Land Management Trends

Several studies (Kendra and Hull, 2005; Kluender and Walkingstick, 2000; Butler and Leatherberry, 2004) document the changing interests and motivations of new forest landowners. For instance, Kendra and Hull (2005) established that landowners in Virginia are primarily

interested in amenity values rather than the monetary value of their timber. The new landowners tend to be more affluent and less interested in traditional timber management, but still interested in management that improves amenity, environment, property boundaries, wildlife habitat, forest health, and privacy.

At a certain acreage threshold, traditional forestry service providers find it difficult to operate profitably. Urbanizing areas lose management capacity as forestry service providers move away due to decreasing incomes. Other traditional sources of income such as hunting leases also become problematic in urbanizing landscapes (Sampson and Decoster, 2000). Landowners desiring a thinning operation or improvement cut on their small acre stand might have difficulty finding a traditional forestry service provider willing to work with them. Harvesting still occurs on small acreages, with a trend towards exploitive harvesting (Munsell and Germain, 2007).

Additionally, traditional forestry service providers find it difficult to work in suburban or urbanizing landscapes (Barlow *et al.* 1998). Residents of these areas have very different expectations than traditional forest landowners. In some areas, city and community ordinances prevent forestry work from happening, such as the entrance of some necessary heavy equipment, or the establishment of temporary logging roads (Egan and Luloff, 2000). Rising fuel costs and smaller acreages contribute to reduced profit margins; many loggers can no longer afford to stay in business.

Public Forestry trends

Changing forest landowner demographics also affect the ability of the public forestry sector to reach the public with assistance and management information about their land. There are more forest landowners, many of whom have limited forestry knowledge and training, but fewer public forestry employees and reduced budgets for government programs. Additionally, traditional outreach methods do not reach or are ineffective with new forest landowners (Downing and Finley, 2005, Huges *et al.* 2005).

Many people in the public forestry sector respond to these trends. For instance, several programs which aim to assist diverse small landowners have arisen in recent years, such as Washington State's Small Forest Landowner office, Vermont's Backyard Forest Stewardship program, and the Backyard Woods program sponsored by the US Forest Service (Hull *et al.* 2004). The Virginia Department of Forestry also organizes literature and workshops to address issues of working in fragmented landscapes for both service providers and new forest landowners.

Need for service providers

These challenges are leading to a crisis in maintaining forestland. Land bases are fragmenting and converting to other uses due to urbanization and changing ownership patterns. Traditional forestry contractors and landowners find it difficult to continue operating. New landowners are not interested in traditional forest management because they see it as irrelevant to their ownership objectives. Despite all of these pressures, forest management is still needed, perhaps more than ever. Sampson and DeCoster (2000) assert that maintaining private land in forests rather than development is crucial, since "once the forest gives way to asphalt, no forestry skill will fix it." They assert that as a solution, we need to help people manage small forests, help governments plan growth patterns, and convince the conservation community that linking economic use to sustainable management protects forests. One of the challenges of sustaining or creating the capacity to profitably steward these forests is the availability of skilled and

profitable service providers. Without service providers to provide the equipment and expertise, management is unlikely to occur on these forests no matter how much management is needed, no matter how many public agency foresters recommend it, or no matter how many land owners want it. Hence, the purpose of this study is to learn from the service providers working with these new forest owners in the changed forest landscape.

METHODS

Information about the current business practices and perceived obstacles of forest service providers was collected through a series of semi-structured telephone interviews with small scale forestry service providers and public forestry agency professionals. Informants were chosen through a purposive sample because of their knowledge of or interest in forest management on small and suburban woodlots. Service providers were chosen from lists created by the Virginia Department of Forestry based on their contacts through short courses and inquires. Interviews lasted from 20 minutes to 2 hours with most taking about 30 minutes. A total of 52 interviews with service providers were conducted between June and December 2008.

Public agency personnel were interviewed via telephone in November and December 2008 about their interactions with small scale forest service providers and landowners. They were identified by initially contacting someone from the department of forestry in several key states. We explained the project to these initial contacts via email, and they were either interviewed, or suggested someone within their department with more knowledge on the subject who could be contacted for an interview. At the conclusion of each interview, we asked each informant to provide the names of other knowledgeable individuals working with the public on small scale forest management issues. A total of 16 people working with the public interests, primarily from either state agencies or NGOs were interviewed.

Interview transcriptions and notes were analyzed using the grounded theory research paradigm (Strauss and Corbin, 1998). Data was analyzed using the qualitative data analysis software NVIVO. From the results, we created a theory on characteristics necessary for a small scale forestry services business, detailed below.

RESULTS

Based on these interviews we identified common perceptions about landowners, management capacity and practices of service providers, and observations, challenges, and responses of public forestry professionals.

Management Capacity and Practice

Most service providers working with small scale and amenity-focused landowners have a background in traditional forestry, arboriculture, the landscaping industry, or in wood processing and woodworking. Small woodlots generally range from 2-20 acres, which is too small for traditional foresters and loggers, and too big for traditional arborists; thus, the industry consists of foresters and loggers who have scaled down and green industry professionals who have scaled up. Woodworkers get into the industry as they look for a cheaper, local, or environmentally sustainable source of raw materials to use.

Many small scale forestry service providers emphasized how different their work is from traditional forestry. Several expressed that they were trying to figure out what they were doing as

they went along – there were few precedents for them to model their business after, and they were writing the book as they go. Many expressed that they felt as if they were the only ones doing small scale forestry work in their areas.

Since we have heard anecdotal accounts that the “new” small acreage landowner was suspicious or untrusting of the forestry profession, we asked service providers how they referred to their work and whether they used the term “forestry”. None of our informants thought they lost business from small acreage clients because they referred to themselves as a forester. Nonetheless, many professionals created new titles for their work. Examples include “total resource management”, “environmental services”, a “biological woodsman”, “conservation services”, “forestry services”, “urban/interface forestry”, and “woodscaping”. Some informants created these names to differentiate themselves from traditional foresters. Others performed a wide variety of services, and did not feel that the term “forester” or “arborist” or “landscaper” adequately described the range of services they provide. They developed new names to better reflect the scope of their work.

The service providers articulated a clear environmental ethic. Some said they would turn down work that violated this ethic. One service provider was a strong proponent of selective harvesting, and would refuse to be a part of a clear-cut unless the landowner desperately needed the money. Several others mentioned that they would refuse to be a part of jobs that involved timber liquidation to clear land for development because they have a problem with site conversion. One stated, “...to us, how much in dollars and cents comes off this woodlot this time around isn’t our primary goal, and if it’s your primary goal, then maybe we’re not the people to be working on your woodlot, and we ought to know this right away, because this is wasting your time and our time.” One informant explained his philosophy on fragmentation: “if you’re practicing restorative forestry on one side of the fence, and you’re practicing restorative forestry on the other side of the fence, then the fence doesn’t count.”

Service providers tried to maintain flexibility and adaptability in their business outlook. They watched market trends and changed their business to follow those trends. For instance, one forester who formerly did more traditional work began to notice the decreasing size of woodlots and, “we began to refine our restorative forestry business to work on those partially sized parcels.” This allowed them to stay ahead of the market, as they are now the only company in their area who does forest management on small acreages. One informant stressed the need to look outside of the box for work rather than only looking for jobs labeled as forestry: “Foresters are trained in environmental awareness, and that can be put to good use... Outside traditional forestry, [foresters] have knowledge of the environment, trees, soils, plants, water and everything.” Others spoke about the importance of having a web presence: “Landowners aren’t afraid to use Google.” Rather than restricting themselves to traditional forester roles, these service providers are actively seeking new ways in which their skills can be useful to the emerging market of small scale landowners, such as one forester who now calls himself an environmental consultant and does everything from traditional harvest, small scale land management, writing Phase I environmental assessments, forest health assessments, to managing a plantation planted over a toxic dump.

Small scale forestry service providers have several practices that differentiate them from traditional forestry work. Firstly, they charge by some measure of time and materials rather than by commission. Economies of scale make the traditional forestry payment scheme less profitable

on small acreages, therefore successful service providers are experimenting with alternative payment schemes. Some informants charge by the hour for their services, while any revenue goes to the landowner in its entirety. This method has its pros and cons – one service provider stated that with this payment method, he is ensured a steady income, but there is also no chance of making a large sum of money on a particularly valuable woodlot. However, most service providers prefer this method. They said the landowner likes the idea that there will be less bias or high-grading in marking timber to be cut, because the logger has less to gain by marking the more valuable timber. Some service providers continue to charge on a commission basis, but have created a sliding scale. They get a higher percentage of the value on less valuable timber. This scale has the advantage of ensuring that the service provider receives adequate payment while the landowner is not required to pay out of pocket by the hour. Some providers use a sliding scale that defines a minimum fee recovered by the service provider from commission—defined as a living wage -- and after that point, the landowner receives a certain percentage of the income from stumpage. Another strategy is to offer the landowner little or no payment for the timber removed, and in return not charge the landowner for the improved health and productivity of the remaining forest. Small scale forestry service providers stated that many of their clients are fairly wealthy, and that the expense of this type of work makes it difficult to reach average and low income clients. Landowners sometimes balk at the initial price – there is an element of “sticker shock”. Service providers believed that increased public funding to cost-share forest management on small acre woodlots would help in reaching more landowners. One service provider called for more government support of small acreage landowners:

“we have folks that are falling between the cracks, they don’t have enough land to qualify for some state programs, and they’re getting squeezed on taxes and crazy local ordinances and things like that. They need a voice, and it’s crazy, the state is only recognizing large property owners, when the majority now I think is falling in the hands of small landowners.”

Successful small scale forestry service providers have diversified their businesses in order to reach a wider range of clientele and to generate multiple revenue streams to increase their profitability and protect their business against market fluctuations. One service provider explained that diversification was one of the main strengths of his business; if the economy dips and he cannot get any tree work, then he can sawmill for a while. Diversification requires that small companies educate themselves in related fields, such as an arborist learning about silviculture. Larger companies sometimes hire professionals from several related industries; for example, a land management firm in Texas employs foresters, wildlife managers, landscapers, landscape architects, and a host of other professionals.

Innovative, clever marketing helps these service providers succeed. A small sawmill operator offers a good example: he was able to exponentially increase his income by selling highly figured woods to the art lumber market on ebay. His lumber contained a large number of “flaws”, often created by knots, water damage, insects, or diseases that make the wood interesting and give it “character”; “That really turned into a rocket ship. I knew there was a good market out there for figured woods, and different colors and textures, but I had no idea what people would actually pay for that type of product... Marketing is literally everything.” He claimed he could come into a woodlot after a traditional forester had taken all he wanted, and

make more than twice as much revenue as the forester by sawing and marketing wood that others consider waste.

Many successful small scale forestry service providers created cooperative or referral agreements between themselves and other companies who did similar work. Companies with these arrangements could more confidently market and promise to take care of any need the landowner has for his or her property. One forester who worked with smaller woodlots had an agreement with an arborist/tree climber and a landscaper. If the landowner requested any services he could not provide, he would refer the work to one of these colleagues, and they did the same for him. In another instance, a tree service company and small sawmill operator worked together; the sawyer received free logs, and the tree service company received free removal of tree boles and a marketing ploy – he attracts business by telling customers they can have furniture made from trees removed from their property.

Successful small scale forestry service providers focus more on amenities than on timber value. They market their work as improving aesthetics, wildlife, recreation, screening, shade, or natural growth. The landowner often makes a profit as well, but the aesthetics is primary. Revenue production is not their primary goal, but few landowners are opposed to it. In other cases, revenue from timber is used to pay for property improvements such as recreational trail creation. The two most important amenity values desired by landowners, as reported by service providers, were aesthetics and wildlife, though owners rarely specified what kind of wildlife they desired. Service providers also emphasized sustainable, low impact, “green” management in their marketing because the “sustainability” rhetoric seemed to attract customers.

Public Forestry Professionals

The public forestry professionals we interviewed were increasingly targeting their work to address the fragmenting forest estate and the growing number of wealthy and influential owners of small forests. These professionals lamented that funding is decreasing and more is expected of them: they are expected to “do more with less”. One stated that their job is growing geometrically, yet their money is not getting any bigger. Another stated that the new role of dealing with forest fragmentation has been added on to rather than replacing the traditional expectation of his job. Agencies have broad goals, and do not have enough time or resources to devote to the issue of small scale forest management, as they have to create balanced programs that speak to landowners at all scales, service providers, and the community at large. Public foresters agree that the number of landowners to reach is increasing, as fragmentation means there are more landowners with smaller acres. They also describe the newer landowners as less “plugged in”, or less familiar with traditional programs such as university extension. These owners do not have experience with forests and do not know where to go for help with their forest management questions. Public foresters also note a dearth of small scale forestry service providers, which it makes it difficult for a public forester to refer a landowner to someone when they need work done. In many regions, the infrastructure of businesses supporting forest services and markets is declining and consolidating. Markets to sell harvested timber are growing increasingly distant, reducing profits and viability of forest management. Public forestry professionals are often frustrated because progress of developing capacity to influence these forests and service these landowners is slow; “It would be great to be able to work on something like this for a year and see the end result and problem solved, but that doesn’t happen. It’s taken a long time to get to this point, and it will take some time to meaningfully address it.”

Public forestry agency professionals indicate that although it is easy to get landowners excited about managing their small scale woodlots, it is more difficult to find service providers willing to work on these lots. They believe that people with forestry backgrounds are the best suited to enter the small scale woodlot management industry. However, public foresters lament that few forestry professionals seem interested in this evolving service industry, perhaps because forestry is a very traditional field. Many agency professionals believe that the green industry will eventually fill this niche because foresters are not adapting quickly enough and because landscape industry service providers are used to focusing on amenities and charging for their time. Public foresters worry, however, because many green industry professionals are not educated about forest health, ecology, silviculture, stand dynamics, soil erosion and harvesting. In states where forestry licensing is required this is problematic. If an arborist agrees to do some harvesting on a small woodlot, at what point is he or she practicing forestry without a license?

Most public forestry professionals agreed that we need a mix of service providers from all backgrounds for different jobs at different scales. One stated, “if the landowner has 10 acres and they’ve got 8 large, high quality white oak trees on each of those 10 acres, they can probably get a traditional logger to come in. If that same landowner has an issue with *Ailanthus* as an invasive species, they may be contacting an arborist. So I guess it depends on the project, the type of products the landowner has and how many acres are involved. I could see where all of them would have value to a landowner at a different point or a different project level.”

The lack of management on the exponentially increasing number of small acreage woodlots worries some public foresters employed by government agencies because it represents a possible shift to irrelevance for them. The “worst case scenario would be a shift to irrelevance for us, and we definitely don’t want to see that happen, so we are trying to meet the new landowner’s needs because we see it as a huge opportunity, and we are the agency for all matters pertaining to forestry within this state, and that’s one of our jobs.”

Perceptions of Landowners

Service providers felt that most landowners were unaware of options for managing their forestland. Several stated that the landowners they encountered did not know that they could or should manage their woodlot. Owners purchase land for reasons such as real estate investment, privacy, or aesthetics, and had little interest in forest management. New small scale landowners have different expectations than traditional forest owners. Some service providers with very traditional backgrounds describe these expectations as unrealistic. For instance, one traditional logger told of how one small-acreage client he worked with expected that he would chip and remove logging debris from the site, which he was unable to do. Others talked about the unrealistic expectations from neighbors. One service provider stated, “You get people complaining all the time about the littlest things possible... I tell them nicely, look, it’s not your land, sorry you’re going look at a cutover piece of land, but it’s just not yours.” This service provider said that he was more likely to encounter these problems on smaller acreage tracts, although it was an issue on larger tracts as well.

We asked whether landowners were willing to pay for small scale forestry services by the hour, or using some other metric, rather than the traditional method of expecting the service provider to recoup the cost of harvesting and make their profits through selling or processing timber. In general, the service providers we interviewed were skeptical of getting paid by the hour. One stated that traditionally, forestry has been done so cheaply that he is not sure people are now

willing to pay. Another service provider stated that he charged by commission whenever possible because he believed that an hourly charge would be cost-prohibitive for some of his clients. Other service providers, typically in more urban areas, said that people were willing to pay by the hour; they understood that they were paying for someone's time. If the management actions would not generate profit from stumpage sales or value added processing, land owners were told ahead of time, and some were willing to pay for services rendered. One service provider described himself as the garbage man. He explained to landowners desiring an improvement cut on their high-graded woodlots that he was essentially talking away their garbage, a service for which they must pay.

Public forestry professionals agreed with small scale forestry service providers that most landowners are not aware of the possibilities and opportunities available on their land. They also agreed that more education was needed for landowners, which, they hoped, would increase the market for service providers. They worried that new landowners are not connected to their land in the same way as generations past. Because owners interact less with their property, they have less sense of the land and its multiple values. One public forestry professional worried about the impact of this trend on future generations: "If they don't learn about it and interact meaningfully with their property, then we've lost an opportunity to engage their youth in the natural environment, engage them as advocates politically and socially for positive natural resource management."

Public forestry professionals note that it is easy to get landowners excited about managing their small woodlots. They state that programs directed towards landowners usually have a high attendance, and landowners seem interested, even indicating on post-workshop surveys that they plan to go home and implement the practices they learned about. However, because there are too few service providers working small woodlots, public forestry professionals are hesitant to get landowners excited about a project only to let them go home and discover that they cannot find anyone to work on their property. This creates a dilemma, because demand and supply for small woodlot forestry services must be created simultaneously.

Public forestry professionals also worry that neighbors in close proximity on small acre woodlots preclude some management options. As one put it, "If you have a 100 acre property subdivided into 10 acre lots, being able to do traditional forest management... is really really hard, because you're infringing on a lot of different people's views of what good forestry is. Those folks generally like their views and aesthetics, and they resist."

Public forestry professionals, in contrast to service providers, were optimistic that the demand for small woodlot management would increase and that landowners would increasingly be willing to pay for forestry services. They maintained that even if the small woodlot services market is currently not fully developed in all areas, it will grow simply because fragmentation and parcelization are continuing; eventually, demand for these services will create a market.

Active management is necessary

The public forestry agency professionals and small scale forestry service providers we interviewed agreed that active forest management on small scale woodlots was beneficial and even necessary. Without such management, several unfortunate trends would likely accelerate. There would be an increased number and spread of invasive plants. Fragmented forests have a higher occurrence of invasives because of the greater amount of edge. When these woodlots are

disturbed through an exploitive harvest, invasives may gain so much of a hold that natural regeneration becomes impossible. The people we interviewed also worried that forest health would decline because woodlots are already degraded from repeated high grading and neglect, and without careful management to improve them, they will continue to degrade, and both timber productivity and economic value will decline. Positive feedback invites future exploitation: woodlots will be ignored until they become valuable enough to harvest, but not valuable enough to make professional management advice affordable. These lots will be exploitatively harvested again and again, further decreasing forest health and future timber value, further reducing the forest economy and the ability to service forest. One informant explained:

“the social costs of no longer viewing forests as part of our environment and our economy, and instead viewing forests as something we have to set aside, I think there’s a loss of the social license and appreciation of the forest and the things our forests provides, both in terms of wood products and ecosystem services. So there’s a cognitive gap in what we expect from our forests and what we perceive our forests as doing.”

Many informants had similar worries about the impacts of the changing appreciation of forests. There seems a common perception among our informants that landowners need to have a vested interest in their property by managing it or using it for recreation or something, because if they do not have a tie to their land, they will lose interest and put it on the market, furthering parcelization. A public forestry professional, for example, stated that managing their forestland promotes quality of life for these landowners – because they are involved in managing their forestland, they enjoy it more. Despite these shared perceptions of the link between engaged landowners and land ethic, we should note that there is little evidence in the literature one way or the other.

DISCUSSION

Our findings parallel those reported in the literature. Service providers reported that new, small acreage landowners have different expectations, raising questions about traditional practices. Fortunately many of these new landowners are easily educated about opportunities for their land, and seem willing to actively manage as long as their amenity values are respected. There is disagreement about the size of market for small scale forestry services; a few service providers were optimistic and actively pursuing the small acreages, but most were generally skeptical. Public forestry professionals were more optimistic, but pointed to the need to build demand for these services by better educating the landowner. The skeptical service providers we spoke to were out on the ground looking for clients to sign a contract, while the public forestry professionals based their optimism on discussions with land owners. We feel confident that small scale forestry services market is emerging, although it is far from developed. Most service providers lack good business and marketing plans, mutually rewarding arrangements among service providers, uniform fee schedule based on services rendered instead of volume removed, new equipment and techniques for amenity-based management, and abilities to offer a diversity of services.

The service providers we spoke with who had success in traditional forest practices on large lots were generally reluctant to change the way they operate. The service providers who were more willing to change seemed optimistic about their potential to profitably move into the niche of

managing fragmenting small acreage woodlots. A few small scale forestry service providers have become very profitable, although many still struggle or worry financially.

Public forestry professionals seem very aware that the shifting ownership patterns portend significant changes for both public and private forestry, and have significant implications for forest health. They see a need for new programs and new approaches.

CONCLUSIONS

As one public forestry agency professional stated, land management professionals from all sectors are going to be needed to address the challenges created by the changing context of forest and forestry. Forestry practices are evolving to reflect the changing land ownership patterns and values. Entrepreneurs working in public and private enterprises are currently exploring this emerging market and developing tools to service the emerging forest. We will need to continue to track their progress as it may foreshadow professional forestry of the future.

REFERENCES:

- Alig, R. J., and Andrew J. Plantinga (2004). "Future Forestland Area: Impacts from Population Growth and Other Factors that Affect Land Values." Journal of Forestry **102**(6): 19-24.
- Barlow, S. A., Ian A. Munn, David A. Cleaves, and David L. Evans (1998). "The Effect of Urban Sprawl on Timber Harvesting." Journal of Forestry: 10-14.
- Brown, D. G., Kenneth M. Johnson, Thomas R. Loveland, and David M. Theobald (2005). "Rural land-use trends in the conterminous United States, 1950-2000." Ecological Applications **15**(6): 1851-1863.
- Butler, B. J., and Earl C. Leatherberry (2004). "America's Family Forest Owners." Journal of Forestry: 4-14.
- Downing, A. K., and James C. Finley (2005). "Private Forest Landowners: What they want in an educational program." Journal of Extension **43**(1).
- Egan, A., and A. E. Luloff (2000). "The Exurbanization of America's Forests: Research in Rural Social Science." Journal of Forestry: 26-30.
- Germain, R. H. A., Nate; Bevilacqua, Eddie (2007). "The Effects of Forestland Parcelization and Ownership Transfers on Nonindustrial Private Forestland Forest Stocking in New York " Journal of Forestry **105**(8): 403-408.
- Huges, G., Marcus K. Measells, Stephen C. Grado, Michael A. Dunn, Joshua O. Idassi, and Robert J. Zielinske (2005). "Underserved Forest Landowner Workshops: Opportunities for Landowners and Extension." Journal of Extension **43**(4).
- Hull, R.B., Robertson, D.P., Buhyoff, G.J. 2004. Boutique Forestry: New forest practices in urbanizing landscapes. Journal of Forestry: **102** (1): 14-19.
- Kendra, A., and R. Bruce Hull (2005). "Motivations and Behaviors of New Forest Owners in Virginia." Forest Science **51**(3): 1-13.
- Kluender, R. A., and T.L. Walkingstick (2000). "Rethinking how nonindustrial landowners view their lands." Southern Journal of Applied Forestry **24**(3): 150-158.
- Munsell, J.F., R.H. Germain (2007). "Woody Biomass Energy: An Opportunity for Silviculture on Nonindustrial Private Forestlands in New York " Journal of Forestry **105**(8): 398-402.

- Oliver, C. D. a. R. M Mesznik (2005). "Investing in Forestry: Opportunities and pitfalls of intensive plantations and other alternatives." Journal of Sustainable Forestry 21(4): 97-111.
- Sampson, N., and Lester DeCoaster (2000). "Forest Fragmentation: Implications for Sustianable Private Forests." Journal of Forestry 98(3): 4-8.
- Strauss, A., and Juliet Corbin (1998). Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory. Thousand Oaks, Sage Publications
- Wear, David N.; Greis, John G. 2002. Southern Forest Resource Assessment - Technical Report. Gen. Tech. Rep. SRS-53. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 635 p..
- Wear, D. N., Douglas R. Carter, and Jeffrey Prestemon (2007). The U.S. South's timber sector in 2005: a prospective analysis of recent change. U. F. S. US Dept. of Agriculture, Southern Research Station.
- Wear, D. N., and David H. Newman (2004). "The Speculative Shadow over Timberland Values in the US South " Journal of Forestry **102**(8): 25-31.

ATTITUDES OF WEST VIRGINIA LANDOWNERS ON THE USE OF PRESCRIBED FIRE AS A FOREST MANAGEMENT TOOL

Kathryn B. Piatek¹ and David W. McGill²

Abstract--Oak species (*Quercus* spp.) have historically dominated the deciduous forest in the eastern U.S.A., facilitated by substantial disturbance from wildfires. Regeneration of oak, however, is decreasing in various parts of the range, and many attribute that to the elimination of wildfires. Prescribed fire is a forest management tool applied by highly trained personnel to forest fuels on a specific land area under specifically-selected weather conditions to simulate some of the effects of wildfire at low-intensity. Prescribed fire is used to promote oak regeneration. Due to risks associated with prescribed fires, we hypothesized that landowners may be unwilling to accept and use prescribed fire as a forest management option, even for the regeneration of oak – a highly valuable species. We surveyed landowners in West Virginia to understand their knowledge, attitudes, and opinions on prescribed fire as a forest management tool. Contrary to our hypothesis, 64% of the responding landowners were supportive of the practice, though more as a general forest management tool than specifically applied to oak regeneration. Acceptance was related to a level of knowledge of prescribed fires, firefighters, and having seen a fire. Among most important concerns were issues related to safety and being informed prior to burning. Therefore, while acceptance of prescribed fires among landowners is high, education, and timely notification can ensure further and, likely, increased, cooperation from the public. However, it appears that at this time, landowners are not likely to use prescribed fires specifically to regenerate oak.

INTRODUCTION

Fire has played an integral role in the development and maintenance of Appalachian forests over the millennia (Abrams 1992, Brose *et al.* 2001, Lorimer 2001, Nowacki and Abrams 2008). As Native American cultures were supplanted by Europeans, extensive land clearing, cultivation, and forest exploitation replaced fire as forest-replacing forces. Along with these activities came increasingly intense fire suppression in the early 1900s (Stephens and Ruth 2005) and associated changes in forest ecosystems which included a shift in fire-dependent oak, pine, and chestnut to fire-sensitive maples, cherry, beech, and hemlock (Nowacki and Abrams 2008).

There is increasing evidence that the successful regeneration of particular species is reliant on fire to control competing vegetation; notable among these are oaks (*Quercus* spp.), as one of the most economically and ecologically valuable species (Brose *et al.* 2001, Shumway *et al.* 2001, Signell *et al.* 2005). Therefore, prescribed fire is increasingly used to facilitate oak regeneration

¹ Kathryn.piatek@mail.wvu.edu

^{1,2} Division of Forestry and Natural Resources, West Virginia University, PO Box 6125, Morgantown, WV 26501, USA.

and research has shown that prescribed fire can promote oak in mixed hardwood ecosystems (Brose *et al.* 1999).

The use of prescribed fire as a management tool brings together both biological science and social science. Fire can be hazardous and, while legal aspects of prescribed fire continue to be developed, the forestry community is beginning to get examples of the ramifications related to legal duty and responsible use of prescribed fire (Sun 2007).

Prescribed fire is generally accepted as a legitimate forest management practice, especially among more educated or informed citizens (Cortner *et al.* 1984, Manfredo *et al.* 1990, Shindler and Toman 2003, McCaffrey 2006, Blanchard and Ryan 2007). However, this acceptance of prescribed fire is context-specific and the fallibility of forest managers is apparent to people who have experienced escaped prescribed fire (Brunson and Evans 2005). In Michigan, the Mack Lake fire, a prescribed fire that escaped control lines, caused substantial property damage, and took the life of one firefighter, led local citizens to claim prescribed fire is a “reckless strategy given past failures” (Winter and Fried 2000). Survey respondents in Florida felt that the risk of escaped prescribed fire was high (Jacobsen *et al.* 2001).

Regional differences in attitudes toward prescribed fire have been shown in several areas of the USA. Loomis *et al.* (2001) found that residents in Florida have a more negative view of wildfires than those in Arizona, apparently at least partly due to the longstanding information campaigns carried out in the western states. Still, Florida residents maintain a low perceived risk of prescribed fire, which is further calmed by educational materials explaining the details of prescribed fire (Loomis *et al.* 2001).

McCaffrey (2006) demonstrated that smoke, control of prescribed burn, and trust in fire authorities are the chief issues associated with acceptance of prescribed fire. To increase the use of prescribed fire for land management purposes, agencies responsible for the safe implementation of these activities will need to more closely integrate the local and regional public into planning and operational efforts. Communication and contact between local government and private citizens increased acceptance of using prescribed fire (McCaffrey 2004). Proximity to a national forest where prescribed fire might be used was not found to be a strong indicator of support for prescribed fire (Vining and Merrick 2008).

Efforts aimed at understanding the interactions of prescribed fire with local populations in the Appalachian Mountains are scarce. In West Virginia in particular, mostly private ownership of relatively small parcels (averaging about 10 ha; Joshi and Arano 2009) of the forest land may deter the use of prescribed fire as a forest management tool. The objective of this study was to begin to understand how landowners in West Virginia might react to an increased use of prescribed fire in close proximity to the Monongahela National Forest. We hypothesized that landowners may be unwilling to accept and use prescribed fire, even for the regeneration of oak – a highly valuable species - due to inherent risks associated with prescribed fires. We conducted a mail survey in 3 regions of West Virginia, and report our results on landowner demographics, general opinions of the use of prescribed fire, differences of opinion among the regions, and factors associated with acceptance.

METHODS

Three regions in West Virginia were selected based on the proximity to the Monongahela National Forest (MNF) (Figure 1), where prescribed burning is likely to be used as a management tool. Two adjacent counties were selected in each of these regions to represent a west-east cross-section of the MNF. A western region included Braxton and Lewis counties, a central region included Randolph and Pocahontas counties, and an eastern region included Grant and Hardy counties. The reason for selecting these regions was that prevailing wind direction from west-to-east creates a potential gradient of smoke pollution from prescribed fire activities. It was hypothesized that such location might influence how landowners view prescribed fire.

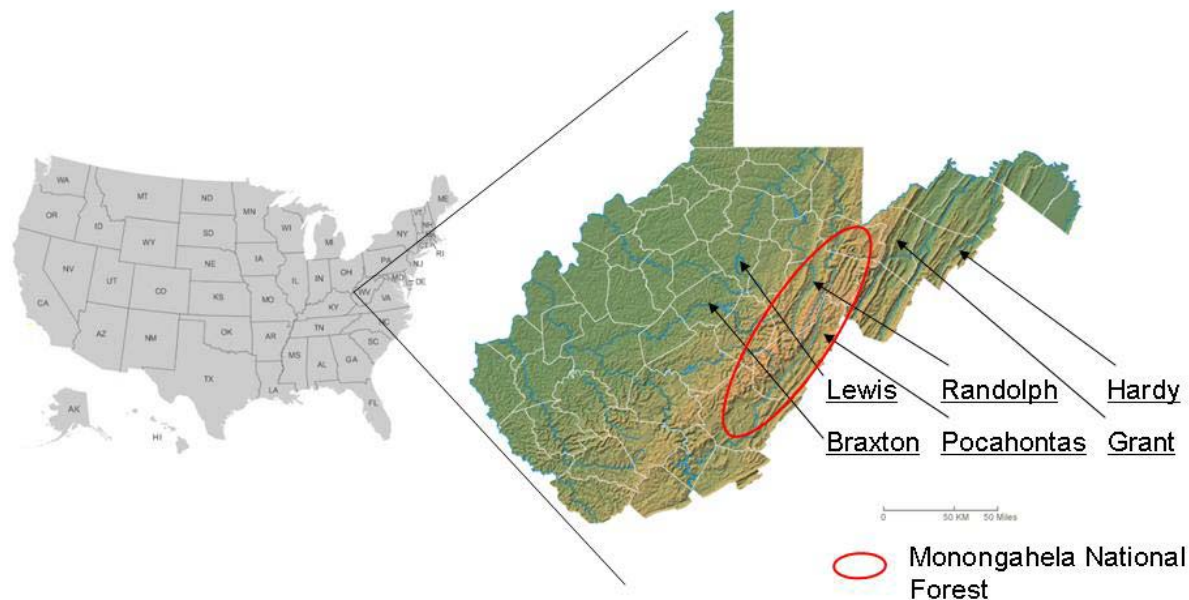


Figure 1. Location of counties in West Virginia, USA, where the study was conducted, and of Monongahela National Forest, where prescribed fires are likely.

One hundred landowners were randomly selected in each of the three regions (300 in total). These individuals were the listed property owners of at least 20.2 ha in a database purchased from the West Virginia Tax Office in spring 2005. This minimum area was selected to pare down the original list of 51,638 property owners in the sampling area and to increase the likelihood that the respective landowners had adequate area to conduct at least one commercial timber harvest. An earlier study surveyed landowners throughout West Virginia who had sold timber between 2001-02 and found respondents' median timber harvesting area to be 16 ha McGill *et al.* (2004). This finding, combined with a desire to be in conformance with the major descriptive category breakpoint of 20.2 ha for the USA nationwide forestland owner surveys (reported by Birch and Kingsley 1978, Birch 1996a, b), led to the choice of 20.2 ha as the lower cutoff for selecting properties to sample.

A questionnaire was developed to assess general attitudes and preferences of private forest owners to the use of prescribed fire. Included in this survey were questions relating to their experiences and knowledge of fire in general and a series of questions to document their demographic attributes.

Draft questionnaires were sent to four natural resource professionals involved in resource management, fire control, and fire ecology to comment on the clarity, terminology accuracy, and additional questions of importance to their own needs. Their comments and editorial suggestions were incorporated into the final questionnaire.

Questionnaires were sent to each of the randomly-selected landowners using a four phase method proposed by Dillman (2000), i.e., a pre-questionnaire postcard, questionnaire, reminder postcard, and second questionnaire. The initial pre-questionnaire notification postcard was sent to landowners in May 2009. Other mailing followed at approximately two-week intervals.

Tests for differences in opinions and attitudes among regions were conducted using a single-factor analysis of variance for responses recorded as ordinal variables (using Likert type scales). The single independent factor 'region' consisted of the regions described above. Logistic regression was used to make comparisons among regions for binary (yes/no) responses. All statistical procedures were carried out using SAS version 9.1. Significance levels were set at $\alpha=0.10$.

RESULTS

Survey Response rate and landowner demographics

Survey addressees returned 131 questionnaires of the total 300 that were initially mailed. Responses included 93 completed and 14 partially completed questionnaires. Complete and partial survey responses represented a 36% response rate (formula 2; AAPOR 2008). Only two of these were classified as noneligible (duplicates). Twenty-four were returned blank (implicit refusals) as requested if the addressee did not want to participate and 162 were considered as unknown eligibility with 26 bad addresses and 136 never returned. Five addressees were deceased. The contact rate for the mailed questionnaire was 46%, the cooperation rate for contacted addressees was 83%, and the refusal rate was 19%.

The average age of the responding landowners was 67 years, with modal annual income in the range of USD \$45,001 to \$60,000. Most of the respondents (24%) completed high-school, and many attended college (29%), with 23% receiving a graduate degree (Table 1). Males made up the majority of the respondents (71%). Secondary education among females was higher (74%) than males (67%), although males had a higher median education level (B.S. degree), likely influenced by the 7 male respondents with a Ph.D. Median education level for females was "some college."

Landowners spent on average 5.8 hours per week exposed to media, the most popular being television (2.2 hrs), radio (1.2 hrs), internet (1.0 hrs), and newspaper (0.8 hrs). Least popular media were magazines (0.6 hrs) and videos (<0.1 hrs) per week.

Many of the respondents had experienced some direct exposure to wildfires. Forty-five percent of the respondents indicated that they had experienced a fire on their properties; these included structure fires (49%), field or pasture fires (21%), and forest fires (45%). Furthermore, 57% had direct contacts with firefighters including close friends (57%), neighbors (36%), family members (28%), and acquaintances (7%).

Table 1. Education of landowners in West Virginia responding to the survey.

Education	Percent Responses
High School	24
Technical/Trade School	5
Associate's degree (2-year college)	5
Some college	14
Bachelor's degree	15
Master's degree	17
Doctorate degree	6
No information	14
Total	100

Landowners Attitudes toward Prescribed Burning

Polled landowners indicated that they had at least a medium level of knowledge of prescribed fires (average score of 2.4 on a scale of 1 for low, to 3 for high). In their view, the level of risk for property loss from wildfires was low (2.2 on a scale of 1 for very low to 4 for high) while that from prescribed fire was moderate (3.2). Still, almost half (48%) of the landowners approved of the use of prescribed fire, while 23% disapproved (Table 2). Clearing the forest floor (23%), unspecified 'other' (22%), and forest growth (18%) were among the most important reasons for approving of the use of prescribed fire (Table 2).

Landowners were somewhat more inclined to use prescribed burning in public and forest industry forests in WV than in private forests (Table 2). Also, majority of the respondents (74%) would be willing to tolerate the smell and the sight of burning up to and more than 5 times per year, while 26% would not be willing to tolerate it at all (Table 2). However, when asked whether it is likely that they will be affected by smoke if more prescribed-burning were used on the Monongahela National Forest, 53% of answers were 'not likely', while 15% said 'very likely', and 15% said 'somewhat likely' – indicating proximity to the forest.

In view of the polled landowners, the biggest perceived benefits of using prescribed fires were: regeneration (20%) and preventing wildfires (19%), followed by 'other' (13%), and clear/control of brush and multiple benefits (12% each) (Table 2).

Landowners had many concerns related to the use of prescribed burning as a management tool. Overwhelmingly, 61% of landowners expressed lack of control as the biggest concern about using prescribed fires, followed by unspecified 'other' at 18% of responses. Among 'important' concerns, the highest response rates (>89%) went to notifying the public prior to burning, liability issues of escaped fires, community safety, safety from escaped fires, and working with local fire-fighting agencies (Fig.2). Post-fire erosion into streams, effects on wildlife habitat, and loss of timber value received > 80% of responses. Community participation in planning, smoke-related issues, costs of prescribed burning, and loss of scenic beauty were important in <78% of responses (Fig. 2). Among "not important", highest percentages of responses went to impaired visibility due to smoke (11%), followed by air pollution from smoke and scenic beauty (6% each), and costs of prescribed burning at 4%.

Table 2. Attitudes of West Virginia landowners toward prescribed fires and associated factors.

Attitudes toward prescribed fire	Percent Response
Approval of prescribed fire	
Approve	48
No opinion	29
Disapprove	23
Reasons for approval	
Clearing the forest floor	23
Forest growth	18
Appropriate/effective tool	12
Prevents wildfire	5
Beneficial to wildlife	5
Fire is natural	5
Other	22
Where should PF be conducted?	
Public forests (in WV)	65
Forest industry land	68
Private (non-industrial) forest	55
Willingness to tolerate smoke/sight	
1-2 times/year	54
3-4 times/year	15
5 or more time/year	5
Not at all	26
Perceived benefits of PF	
Regeneration	20
Preventing wildfires	19
Control brush	12
Multiple benefits	12
Other	13
No benefits	16

“Not important” received on average 3% of responses, while average non-response rate for this question was 7%. Overall, 64% of landowners were either ‘somewhat supportive’ or ‘very supportive’ of the use of prescribed burning in forests. One out of four (25%) was at least somewhat opposed to the use of prescribed fire.

When asked about alternative approaches to regenerating oak seedlings which compete poorly with heavy competition from other species, 34% of responding landowners said that the best approach would be prescribed-burning, 29% said that mechanical approach (using chainsaws, bulldozers, weed eaters or whackers to eliminate competition) would be best, while 22.4% said ‘do-nothing’ would be best. Only 2.3% of responses indicated that using herbicide would be best approach. Highest percentage of opinions on the ‘worst’ approach went to herbicide use at 32.8% of responses, followed by ‘do-nothing’ at 22.4%; both mechanical and prescribed-burning approaches received ‘worst’ 9.6% of times.

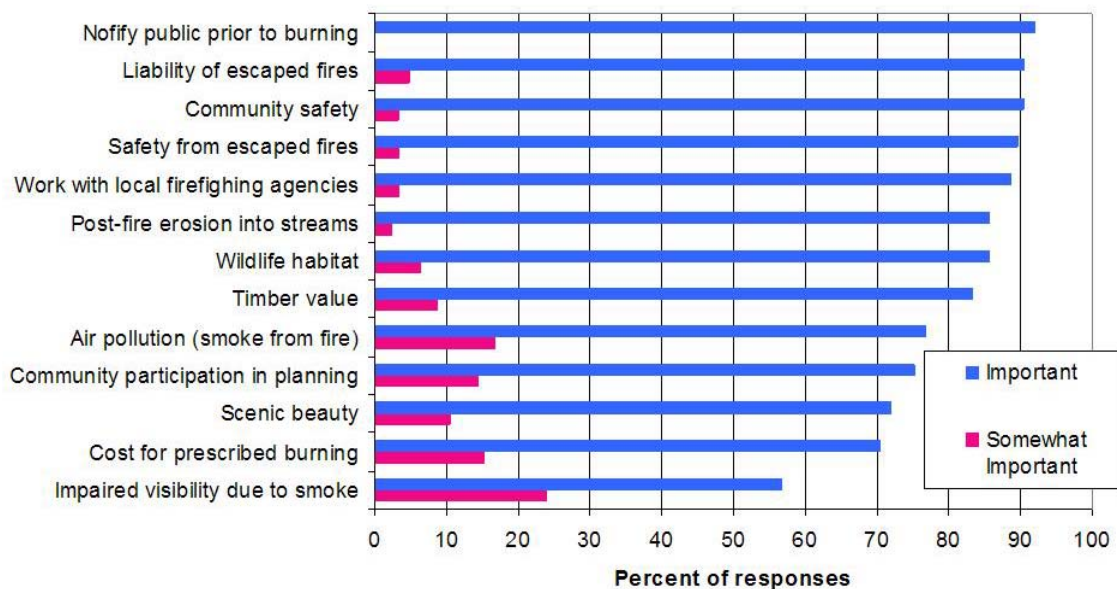


Figure 2. Percent importance landowners in West Virginia associated with each concern about using prescribed fires. “Not important” received on average 3% of responses, while average non-response rate for this question was 7%.

Comparison of Opinions of Prescribed Fire among Regions

Several opinions related to prescribed fire differed among regions of West Virginia. Respondents in the central region were more supportive of prescribed burning than those in the west. On a scale of ‘very supportive’ (4) to ‘against’ (1), the respondents of the central region averaged 3.12 compared with 2.70 in the eastern region and 2.44 in the western region. Eastern region support scores were statistically greater than those of the western region ($p=0.020$).

For the most part, concerns related to prescribed burning were consistent among regions. However, safety from escaped fires and importance of working with local firefighting agencies were of greater importance to landowners in the eastern than the western region ($p=0.067$ and $p=0.028$, respectively).

The only difference between willingness to accept prescribed burning on public or private properties was for the removal of logging debris after timber is harvested on public lands. In this case, landowners in the western region were 4.3 times more likely to believe this activity should not be carried out on public lands ($p=0.036$).

Factors associated with Approval of Prescribed Burning

Approval of prescribed burning – in general at 48% - was associated with respondents who knew a firefighter and who felt that they have a high level of knowledge about prescribed fires (Table 3). Furthermore, those that had seen a forest fire had twice the odds ($OR=2.14$), or were 20% more likely to approve than to disapprove of prescribed fire; those that had not seen a forest fire were only half as likely to approve of using prescribed fire.

Table 3. Variables associated with approval of prescribed fire in West Virginia.

Independent variable ¹	OR ²	90% CI ³	P > χ^2 ⁴
Total media time	0.98	0.91–1.05	0.569
Newspaper	1.03	0.65–1.63	0.91
Internet	0.91	0.74–1.13	0.479
Television	1.02	0.84–1.24	0.876
Radio	0.97	0.84–1.13	0.769
Video	* ⁵	*	*
Magazines	0.96	0.83–1.10	0.591
Know a firefighter	3.49	1.73–7.01	0.003
Knowledge level (about prescribed fire)	2.26	1.22–4.17	0.029
Affected by smoke	0.49	0.23–1.02	0.110
Gender	0.69	0.38–1.27	0.317
Have seen a forest fire	2.14	1.06–4.32	0.077
Experienced fire on property	0.70	0.32–1.54	0.368

¹Logistic regression using binary dependent variable “approve of the use of prescribed fire in forests”, ²Odds ratio (OR), ³90% confidence interval of the odds ratio point estimate, ⁴Probability value for the Wald χ^2 test, ⁵* Indicates lack of adequate model due to too few observations.

DISCUSSION

Attitudes of West Virginia Landowners on the Use of Prescribed Fire

An overwhelming fraction of the respondents supported the use of prescribed fire as a forest management tool (at 64% of combined favorable categories). However, prescribed burning did not appear to be the preferred method specifically for oak regeneration, but rather, a general forest management tool. While 63% of respondents approved of activities designed to increase oak regeneration, only 5% more landowners preferred prescribed burning over mechanical means. Still, almost half of the respondents (49%) approved of prescribed burning as a management tool, and within that, 18% indicated that enhancing forest growth, presumably via eliminating competing growth, was one of the reasons for that approval. When the question about reasons for approval was asked in a different manner, about the same fraction went to regeneration, while preventing wildfires increased 300%, and clearing/controlling brush decreased by about half. The reasons for different responses are not clear; however, it is very likely that the respondents understood response options “clearing the forest floor” (first question) and “preventing wildfires” (second question) as synonymous, since most fuels feeding forest fires are found in the forest floor.

High level of acceptance of prescribed burning is consistent with trends found elsewhere in the USA, especially among the more educated citizens (Cortner et al 1984, Manfredo *et al.* 1990, Shindler and Toman 2003, McCaffrey 2006, Blanchard and Ryan 2007).

In contrast to findings elsewhere (McCaffrey 2006), the polled West Virginia landowners did not seem concerned about the inconvenience associated with smell or decreased visibility, nor even loss of scenery. Rather, an overwhelming 61% of the polled West Virginia landowners indicated that lack of control was their biggest concern associated with the use of prescribed burning. In fact, it was somewhat surprising that landowners would deem risk from wildfires as less than from prescribed burning. This may be associated with fear and with the perception that wildfires

occur in remote areas, far from dwellings. Regardless of reasons, this trend of sensing great risk has been described elsewhere, and is particularly acute in areas that have experienced damage to property and loss of human life from escaped prescribed fire activities (Winter and Fried 2000, Jacobsen *et al.* 2001, Brunson and Evans 2005).

Importance of Communication to Acceptance of Prescribed Fire

An overwhelming number of landowners viewed public notification among the most important concerns related to the use of prescribed fire as a management tool. Our data also indicate that an increased level of communication between forest managers and the public, especially providing information about safety precautions, may further increase the number of landowners willing to support prescribed burning. This reveals that communication is important for increasing public acceptance of the use of prescribed fire as a management tool, and local forest management needs to work with the public during the planning stages. It has been shown elsewhere that communication and contact between local government and the citizens increased acceptance of using prescribed fire (McCaffrey 2004). Part of the communication effort should include education, because those among the polled landowners who felt they knew about prescribed burning were more likely to accept this practice.

Choice of media for communicating of management activities that include prescribed burning will be an important consideration in that regard. As expected, polled landowners preferred television over internet or newspapers; therefore, TV stations should be a medium of choice for providing timely information. At the same time, choice of programming may be more pertinent to whether or not notification reaches the intended audience; namely, if TV-viewing time is focused on the news which are more likely to carry public announcements, the notification would be on target; however, watching popular TV shows which would be less likely to carry public announcements would not accomplish the task. Radio and newspaper seem the other most applicable media for landowners in WV to find out about public announcements.

CONCLUSIONS

We conclude that there certainly do not seem to be strong obstacles among West Virginia landowners to the use or increased use of prescribed burning. The technique seems to be well accepted as a general forest management tool, though not specifically for oak regeneration. However, concerns for the safety of property and human lives are high and must be taken into account by local forest management agencies. Communicating with the public about planned burning activities will go a long ways toward alleviating these concerns.

ACKNOWLEDGEMENTS

The authors express appreciation to C. Murphy, T. Schuler, R. Ozburn, N. Pollack, and R. Williams for contributing to the development of the questionnaire. Thanks go to K. Nkansah and J. Wang for providing questionnaire reviews. R. Junod and K. McKeever provided initial data summaries.

REFERENCES

- Abrams MD. 2005. Prescribing fire in eastern oak forests: Is time running out? *North. J. Appl. For.* 22(3):190-196.
- Abrams MD. 1992. Fire and the development of oak forests. *BioSci.* 42(5):346-353.

- Birch T, Kingsley N (1978) The forest-land owners of West Virginia. Resource Bull NE-58. U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station, Broomall, PA.
- Birch TW (1996a) Private forest-land owners of the Northern United States, 1994 Resour Bull NE-136. U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station, Radnor, PA.
- Birch TW (1996b). Private forest-land owners of the United States, 1994 Resource Bull. NE-134. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station, Radnor, PA.
- Blanchard B, Ryan R. 2007. Managing the wildland-urban interface in the northeast: Perceptions of fire risk and hazard reduction strategies. *North. J. Appl. For.* 24(3):203-208.
- Bright AD and Newman P. 2006. How forest context influences the acceptability of prescribed burning and mechanical thinning. In McCaffrey S. (ed.), *The public and wildland fire management: social science findings for managers*. GTR NRS-1. United States Department of Agriculture, Forest Service, North Central Research Station, St. Paul, MN, pp. 47–52.
- Brose P., Shuler T, VanLear D, Berst J. 2001. Bringing fire back: The changing regimes of Appalachian mixed-oak forests. *J. For.* 99(11):30-35.
- Brunson MW, Evans J. 2005. Badly burned? Effects of an escaped prescribed burn on social acceptability of wildland fuels treatments. *J. For* 103(3):134-138.
- Cortner HJ, Zwolinski MJ, Carpenter EH, Taylor JG. 1984. Public support for fire-management policies. *J. For.* 82(6):359-361.
- Dillman D. 2000. *Mail and internet surveys: The tailored design method*, Wiley, New York.
- Jacobsen SK, Monroe MC, Marynowski S. 2001. Fire at the wildland interface: the influence of experience and mass media on public knowledge, attitudes, and behavioral intentions. *Wildlife Society Bulletin* 29(3):929-937.
- Joshi, S., and Arano KG. 2009. Determinants of private forest management decisions: A study on West Virginia NIPF landowners. *Forest Policy and Economics* 11(2):132-139.
- Loomis JB, Bair LS, Gonzalez-Caban A. 2001. Prescribed fire and public support—Knowledge gain, attitudes changed in Florida. *J. For.* 99(11):18-22.
- Lorimer CG. 2001. Historical and ecological roles of disturbance in eastern North American forests: 9,000 years of change. *Wildlife Soc. Bulletin* 29(2):425-439.
- Manfredo MJ, Fishbein M, Haas G, Watson AE. 1990. Attitudes toward prescribed fire policies—the public is widely divided in its support. *J. For.* 87(7):19-23.
- McCaffrey SM. 2004. Fighting fire with education: What is the best way to reach out to homeowners? *J. For.* 102(5):12-19.
- McCaffrey SM. 2006. Prescribed fire: What influences public support? In: Dickenson MB, ed. 2006. *Fire in eastern oak forests: delivering science to land managers, proceedings of a conference; 2005 November 15-17; Columbus, OH. Gen. Tech. Rep. NRS-P-1*. U.S. Department of Agriculture, Forest Service, Northern Research Station, Newtown Square, PA: 192-198.
- McGill DW, Magill DJ, Kochenderfer J, Ford WM, Schuler T (2004). Information transfer during the timber transaction period in West Virginia, USA. In *Proceedings, “Communication Strategies for Multiple Partner Involvement in Forest Extension” IUFRO forestry extension conference, Orvieto, Italy September 2004*. Accessed online (May 15, 2009): <http://www.iufro.org/download/file/842/3176/60602-orvieto04-proceedings.pdf>

- Nowacki, G.J., and M.D. Abrams. 2008. The demise of fire and “mesophication” of forests in the eastern United States. *BioScience* 58: 123-138.
- Pyne S. 2004. Pyromancy: Reading stories in the flames. *Conservation Biology* 18(4):874-877.
- Shindler B, Toman E. 2003. Fuel reduction strategies in forest communities—A longitudinal analysis of public support. *J. For.* 101(6):8-15.
- Shumway DL, Abrams MD, Ruffner CM. 2001. A 400-year history of fire and oak recruitment in an old-growth oak forest in western Maryland. *Can. J. For. Res.* 31:1437-1443.
- Signell SA, Abrams MD, Hovis JC, Henry SW. 2005. Impact of multiple fires on stand structure in central Appalachian oak forests. *For. Ecology and Manage.* 218(1-3):147-158.
- Stephens SL, Ruth LW. 2005. Federal forest-fire policy in the United States. *Ecological Applications* 15(2):532-542.
- Sun C. 2007. Common law liability for landowners when using prescribed fires on private forest land in the southern United States. *For. Sci.* 53(5):562-570.
- Vining J, Merrick MS. 2008. The influence of proximity to a National Forest on emotions and fire-management decisions. *Environmental Management* 41(2):155-167.
- Winter G, Fried JS. 2000. Homeowner perspectives on fire hazard, responsibility, and management strategies at the wildland-urban interface. *Soc. and Nat. Res.* 13: 33-49.

DEMOGRAPHIC ANALYSIS OF FAMILY FOREST OWNERS IN RELATION TO EDUCATIONAL PROGRAM PARTICIPATION

Maminiaina S. Rasamoelina¹, James E. Johnson², and R. Bruce Hull³

Abstract--Family forest ownership is vitally important in the USA, where 48% of the total forest land is held by this group (synonymous with nonindustrial private forest ownership). A demographic analysis was conducted of three categories of family forest owners in Virginia. The three categories consisted of forest owners who had attended one or more of the educational shortcourses offered by the Virginia Forest Landowner Education Program (VFLEP), forest owners who attended one or more other educational programs related to forest management, and forest owners who had never attended any forest-related educational programs. Forest owners who seek out educational programs tended to be younger, more affluent, and better educated than those who did not attend any educational programs. These owners also owned larger forested tracts, and rated themselves as higher on the innovation-adoption scale, indicating that they are more likely to adopt new practices learned in the educational programs. More work is needed to ensure that future educational programs are effectively targeting this category of landowner.

INTRODUCTION

Of the 749 M acres of forest land in the whole United States, 360 M acres (48%) are under family ownership (Salmon *et al.* 2006). In this paper, family ownership is viewed as synonymous with nonindustrial private forest (NIPF) ownership. Virginia is a heavily forested state, with about 16 M acres of forestland. Approximately 77% of the state forest base belongs to family owners (Shaffer and Meade 1997). These numbers imply that the future of Virginia's forests cannot be ensured without strong emphasis on sustainable management of private land. Ensuring sustainable management includes the use of a suite of tools, including technical assistance, financial assistance, favorable tax policies, and educational programs designed to meet the needs of a variety of forest owners. In 1996, the Virginia Forest Landowner Education Program (VFLEP) was created from a partnership involving the Sustainable Forestry Initiative (SFI), the Virginia Department of Forestry (VDOF), the Virginia Forestry Association (VFA), and Virginia Tech's College of Natural Resources and Cooperative Extension Service (Johnson *et al.* 2004). The purpose of VFLEP was partly to encourage family forest owners to:

- *obtain professional advice and technical assistance,*
- *develop and implement a written management plan,*

¹ Maminiaina S. Rasamoelina, WWF Madagascar & West Indian Ocean Programme Office, II-M-85 Ter, Antsakaviro, Antananarivo 101, Madagascar, mamiaina@vt.edu

² James E. Johnson, College of Forestry, 109 Richardson Hall, Oregon State University, Corvallis, Oregon 97333, jim.johnson@oregonstate.edu

³ R. Bruce Hull, Department of Forestry, 310 Cheatham Hall, Virginia Tech, Blacksburg, Virginia 24061, hullrb@vt.edu.

- *obtain financial assistance through multiple cost-share opportunities,*
- *adopt sustainable forest management practices.*

From October 1997 through February 2004, nearly 2000 people attended one or more of the three VFLEP shortcourses offered: Woodland Options, Wildlife Options, and Timber Harvesting and Marketing. This study was intended to determine the effectiveness of the VFLEP courses in moving the forest owner participants toward adoption of woodland management practices. This paper presents the demographic analysis associated with groups of family forest owners who attended VFLEP courses, those who attended other educational programs, and a group of forest owners who had never attended any educational programs associated with forest management. This research was undertaken to determine the effect of educational programs on the adoption of woodland management practices by family forest owners.

RESEARCH METHOD

We had three main groups within the forest owner target population: owners who had attended at least one of the VFLEP shortcourses; owners who had not attended any of the three courses offered under the VFLEP program but attended at least one other educational program related to forest management, and owners who attended neither the VFLEP courses nor any other educational program. The three groups had a common denominator in that all forest owners had been exposed to a common level of awareness concerning the possibility of attending educational programs through the Virginia Forest Landowner Update newsletter. This paper focuses on the hypothesis that there are no differences in demographic factors between the three groups of family forest owners.

The study population for this research included family forest owners who were listed in the VFLEP database. This large database had been compiled over many years, and consisted of forest owners who attended some type of educational programs offered through the Virginia Cooperative Extension Service, as well as forest owners selected at random from county tax rolls. All forest owners in the database who owned at least 2 ac of forest land in Virginia were included, resulting in a survey population of 5793 forest owners. A proportionate stratified random sampling design was used to select 3435 forest owners (60% of the survey population), which kept the same proportions of individuals in the three groups in the final sample as in the original population. Thus, the final sample included 1038 owners in the VFLEP group and 2397 in the non-VFLEP group. The third group was developed following the survey.

For validity purposes, the survey questionnaire was pilot tested; it was mailed to 120 family forest owners using the Dillman's (2000) tailored design method, using an advance letter that alerted them to the survey, followed by the survey package (covering letter, questionnaire, self-addressed stamped return envelope) a week later. For practical reasons, the pilot test was conducted with forest owners living in Montgomery County, Virginia. After all responses from the pilot test were gathered, a focus group consisting of local family forest owners was held to ensure the validity of the questions. Focus group participants made comments, and provided suggestions about unclear questions which had been identified in the pilot test. The focus group was also used to obtain input from respondents about the presentation of the survey (length, format, wording of questions, font size).

The questionnaire was mailed after analysis of the pilot test, and correction and revision following the focus group. It was administered using a slightly modified version of the Dillman's tailored design method (Dillman, 2000) by using two waves of mailings of the survey packet (advance letter, cover letter, questionnaire, self-addressed stamped return envelope), and a wave of reminder cards to initial non-responders after a month. The first mailing was in late April 2007. A month after the first reminder card was sent, a second mailing was made of the survey packet together with a further reminder, for non-respondents. Recipients were requested to return the questionnaire even if they did not fill it out, and to provide a reason why it was not filled out.

The hypothesis was tested using a one way Analysis of Variance (ANOVA). When the ANOVA results showed significant differences at the 0.05 level, we used a post-hoc test to identify which groups differed. The method used for the post-hoc test depended on whether there was equality of variance across the three groups. The Levene test was used to test the equality of variance (if its result shows a significant difference, then unequal variance is assumed, but if not, equal variance is assumed). Depending on the outcome of the test of equality of variance, either the Tamhane's test (which is based on the t-test), or the Fisher's Least Significant Difference (LSD) method was used to determine which means differed. The first was used if variances were unequal and the second for equal variances. All tests used a level of significance of 0.05.

RESULTS AND DISCUSSION

The survey resulted in 1097 usable responses for a response rate of 32%, typical for landowner surveys. The distribution of responses across the three groups is shown in Table 1.

Table 1. Distribution of the respondents across the three groups (N= 1097)

Forest owner group	Frequency	Relative frequency (%)
Owners who did not attend any educational program (no educational program)	321	29
Owners who attended at least one of the VFLEP courses (VFLEP Attendees)	489	45
Owners who did not attend VFLEP courses but attended other programs (other educational programs)	287	26

The ANOVA results for the key demographic variables of age, level of education, relative income from the forest, and total household income are presented in Table 2. All variables show significant differences at the 0.05 level. All three groups had equal variances for age, however they had unequal variances for the other three demographic variables (Table 3). Thus, Fisher's LSD was used for multiple comparisons for age, while Tamhane's test was used for the comparisons of the other variables.

Multiple comparisons of demographic variables (Table 4) reveal that owners who did not attend any educational program were significantly older than those that did, and those who attended the VFLEP program were older than those who attended other educational programs. Differences with respect to formal education also exist. Those attending VFLEP or other workshops tend to

Table 2. Analysis of variance results for four demographic variables

Variable		Sum of squares	Degrees of freedom	Mean square	F	Sig.
Age (yr)	Between Groups	2902.672	2	1451.336	10.16	.000
	Within groups	151772.364	1062	142.912		
	Total	154675.037	1064			
Level of education	Between groups	183.876	2	91.938	39.22	.000
	Within groups	2506.091	1069	2.344		
	Total	2689.966	1071			
% income from forest	Between groups	625.382	2	312.691	3.863	.021
	Within groups	80461.458	994	80.947		
	Total	81086.841	996			
Household income (\$)	Between groups	23.497	2	11.749	9.994	.000
	Within groups	1121.433	954	1.176		
	Total	1144.930	956			

Table 3. Test of homogeneity of variances for demographic variables

Variable	Levene Statistic	df1	df2	Sig.
Age (yr)	0.829	2	1062	.437
Level of education	19.685	2	1069	.000
% income from forest	3.791	2	994	.023
Household income (\$)	3.252	2	954	.039

have more formal education than those who do not attend forest workshops. However, attendees of VFLEP and other programs were not statistically different. Attending an educational program suggests a favorable attitude toward the implementation of sustainable forestry practices, thus survey results confirmed Blatner *et al.* (1991), Arano *et al.* (2005), and Potter-Witter (2005), who found that owners who adopted behavior related to sustainable forest management tended to be younger and have higher level of educational attainment compared to those who did not. Also, owners who attended other programs than the VFLEP tended to earn a higher proportion of their total income from their forest compared to those who attended the VFLEP program, while owners who did not attend any educational program did not earn either significantly more than VFLEP attendees or significantly less than those who attended other educational programs. This indicates that the VFLEP courses are targeting an audience that does not rely heavily on the forest for income, which is typical for Extension courses that focus on a variety of resource management concerns in addition to those focused on earning income. Owners who did not attend any educational programs earn significantly less money compared to the two other groups, which earn statistically the same amount of annual household income; which was also confirmed by both Blatner *et al.* (1991) and Arano *et al.* (2004).

Table 4. Multiple comparisons for demographic variables

Variable	(I)	(J)	Mean diff (I-J)	Std. error	Sig.
Age (yr)	No educational program	VFLEP attendees	2.187(*)	.874	.012
		Other educational programs	4.448(*)	.987	.000
	VFLEP attendees	No educational program	-2.187(*)	.874	.012
		Other educational programs	2.260(*)	.900	.012
	Other educational programs	No educational program	-4.448(*)	.987	.000
		VFLEP attendees	-2.260(*)	.900	.012
Level of education	No educational program	VFLEP attendees	-0.801(*)	.118	.000
		Other educational programs	-1.039(*)	.128	.000
	VFLEP attendees	No educational program	0.801(*)	.118	.000
		Other educational programs	-0.238	.108	.081
	Other educational programs	No educational program	1.039(*)	.128	.000
		VFLEP attendees	0.238	.108	.081
Income from forest (%)	No educational program	VFLEP attendees	-0.212	.698	.986
		Other educational programs	-1.911	.828	.063
	VFLEP attendees	No educational program	0.212	.698	.986
		Other educational programs	-1.699(*)	.700	.046
	Other educational programs	No educational program	1.911	.828	.063
		VFLEP attendees	1.699(*)	.700	.046
Household income (\$)	No educational program	VFLEP attendees	-0.247(*)	.088	.016
		Other educational programs	-0.420(*)	.096	.000
	VFLEP attendees	No educational program	0.247(*)	.088	.016
		Other educational programs	-0.173	.082	.100
	Other educational programs	No educational program	0.420(*)	.096	.000
		VFLEP attendees	0.173	.082	.100

* The mean difference is significant at the 0.05 level.

Three additional forest owner characteristics were also evaluated: ownership size, the distance from home to the forest, and a self-rated innovation scale that asked the respondent to identify where they placed themselves on a continuum from an innovator to a laggard (Rogers 2003), on a five point scale. At least two of the three groups differed in terms of ownership size and innovation; while no significant difference was found in terms of distance from home to forest (Table 5).

Table 5. Analysis of variance results for three forest owner characteristics

Variable		Sum of squares	df	Mean square	F	Sig.
Ownership size (ac)	Between groups	1801641.25	2	900820.62	9.96	.000
	Within groups	92620325.10	1025	90361.3		
	Total	94421966.36	1027			
Distance home-forest	Between groups	50784.02	2	25392.01	0.64	.523
	Within groups	35576889.33	910	39095.48		
	Total	35627673.35	912			
Self-rated innovation	Between groups	81.90	2	40.95	20.17	.000
	Within groups	2017.72	994	2.03		
	Total	2099.63	996			

The test for homogeneity of variance (Table 6) shows that both land size and the self-rated attitude toward adoption have unequal variances across the three groups; therefore, the Tamhane's test was used for mean separation.

Table 6. Test of homogeneity of variances for three forest owner characteristics.

Variable	Levene Statistic	df1	df2	Sig.
Ownership size (ac)	14.512	2	1025	.000
Distance home-forest	1.832	2	910	.161
Self-rated innovation	5.242	2	994	.005

Attendees of VFLEP programs owned significantly more land than the two other groups, in which owners had statistically equal land sizes. Blatner *et al.* (1991) found that forest owners who received some sort of assistance (educational and/or technical) tended to own larger forest tracts. In the case of our study we assume that VFLEP attendees were a fairly committed category of forest owners, since all VFLEP shortcourses involved 12 hours of instruction over three evenings. Owners who did not attend any educational programs tended to rate themselves as being more reluctant to adopt innovations compared to the two other groups, in which owners rated themselves equally but statistically more favorable to adoption.

Table 7. Multiple comparisons for forest owner characteristics

Dependent variable	(I)	(J)	Mean dif. (I-J)	Sig.
Ownership size (ac)	No educational program	VFLEP attendees	-84.598(*)	.000
		Other educational program	-0.829	1.00
	VFLEP attendees	No educational program	84.598(*)	.000
		Other educational programs	83.769(*)	.001
	Other educational programs	No educational program	0.829	1.00
		VFLEP attendees	-83.769(*)	.001
Self-rated n innovatio	No educational program	VFLEP attendees	-0.563(*)	.000
		Other educational programs	-0.731	.293
	VFLEP attendees	No educational program	0.563(*)	.000
		Other educational programs	-0.169	.293
	Other educational program	No educational program	0.731(*)	.000
		VFLEP attendees	0.169	.293

* The mean difference is significant at the 0.05 level.

CONCLUSIONS

Forest owners who attended educational programs tended to be younger, more educated, more affluent, and more innovative than forest owners who had not attended any educational programs. This population may desire educational programs other than the traditional face-to-face meetings offered during evenings or weekends. A stakeholder focus group held in Virginia in 2003 indicated the interest in developing web-based short-course offerings, but not at the expense of face-to-face programming (Johnson *et al.* 2004). Early offerings of the Woodland Options short course via the web resulted in 173 participants, which indicate that this may be a viable delivery option for the future (Johnson and Baker 2004).

Attendees of the VFLEP shortcourses also tended to own larger tracts of forest land than attendees of other educational programs or those who had not attended any educational programs. Again, programs need to be offered to target owners of smaller parcels, as the current trend in the USA is toward smaller parcel sizes (Butler 2008). The ‘boutique forestry’ described by Hull *et al.* (2004) will require new approaches to reach a new set of forest owners with decidedly different motivations for owning forest land and objectives for its management. Forest owners who had attended educational programs rated themselves as more innovative than those who had not attended any educational programs, indicating that those forest owners who valued education may be more likely to put into practice their new knowledge. This is a key outcome that extensionists and technical assistance providers hope to achieve. As forest land parcels

become smaller and smaller, it is likely that owners will increasingly look to resource values other than timber income. Extension programs designed to assist these forest owners to maximize those values will become increasingly popular.

REFERENCES

- Arano, K. G., I.A. Munn, J. E., Gunter, S. H. Bullard and M.L. Doolittle. 2004. Comparison between regenerators and non-regenerators in Mississippi: A discriminant analysis. *Southern Journal of Applied Forestry* 28 (4): 189-195.
- Blatner, K.A., D.M. Baumgartner and L.R. Quackenbush. 1991. NIPF use of landowner assistance and education programs in Washington State. *Western Journal of Applied Forestry* 6 (4): 90-94.
- Butler, B.J. 2008. Family forest owners in the United States, 2006. U.S.D.A. Forest Service Northern Research Station, General Technical Report NRS-27.
- Dillman, D.A. 2000. Mail and internet surveys: the tailored design method. John Wiley, New York..
- Hull, R.B., D.P. Robertson and G.J. Buhyoff. 2004. Boutique forestry: new forest practices in urbanizing landscapes. *Journal of Forestry* 102 (1): 14-19.
- Johnson, J. E., S. A. Baker, and J.D. Starr. 2004. Assessing future directions for Forest Landowner Education in Virginia. *Virginia Forests* 60 (1):19-22.
- Johnson, J.E. and S.A. Baker. 2004. Communicating with forest owners: a web-based distance education approach. In Communication Strategies for Multiple Partner Involvement in Forestry Extension. Proceedings of the IUFRO 7th Extension Working Party Symposium, Sept. 27 – Oct. 1, 2004. Orvieto, Italy.
- Potter-Witter, K. 2005. A cross-sectional analysis of Michigan non-industrial private forest landowners. *Northern Journal of Applied Forestry* 22 (2): 132-138.
- Rogers, E.M. 2003. Diffusion of innovations. Free Press, New York.
- Salmon, O., M. Brunson and M. Kuhns. 2006. Benefit-based audience segmentation: a tool for identifying Nonindustrial Private Forest (NIPF) owner education needs. *Journal of Forestry* 104 (8): 419-425.
- Shaffer, R.M. and G.S. Meade. 1997. Absentee forest landowners in Virginia. *Virginia Journal of Science* 48 (3): 219-224.

WOODLAND OWNER NETWORKS AND PEER-TO-PEER LEARNING

Eli S. Sagor¹, Maureen H. McDonough², and Shorna Broussard Allred³

Abstract--Small private forest owners consistently list peers as preferred sources of forest management advice. Since January 2008, the Woodland Owner Networks project has been investigating program models designed to foster peer-to-peer interaction and learning to support private forest management decisions. In April 2009, the project brought together 52 researchers, agency administrators, funders, and leaders and members of woodland owner organizations large and small, representing a wide diversity of program objectives and models. The symposium was designed to bring together formal academic research with other perspectives and ways of knowing about peer-to-peer learning about natural resources. The symposium will have three primary outputs:

- A list of practical tools and best practices based on both research and informal first hand learning by program organizers;
- a statement of the current state of knowledge, knowledge gaps, and skill development needs; and
- a statement of emerging opportunities and barriers to peer-to-peer learning in the future.

This presentation will review the rationale (and risks) behind peer-to-peer learning to support sound small-scale forest management and report on the outcomes of the April 2009 symposium. It will also include a review of recent research results from ongoing qualitative and quantitative analyses of the outcomes and impacts of peer-to-peer learning in a small-scale private forestry context.

INTRODUCTION

Small private forest owners consistently list peers as preferred sources of forest management advice. Since January 2008, the Woodland Owner Networks (WON) project has been investigating program models designed to foster peer-to-peer interaction and learning to support private forest management decisions. One primary component of the WON project was a symposium held at the Minnesota Landscape Arboretum in late April, 2009. Fifty-two researchers, agency administrators, funders, and leaders and members of woodland owner organizations large and small, representing a wide diversity of program objectives and models, participated in the symposium. The event was designed to incorporate formal academic research with other perspectives and ways of knowing about peer-to-peer learning about natural resources.

¹ Corresponding author: University of Minnesota Extension, 1530 Cleveland Avenue North, St Paul, MN 55108 USA, esagor@umn.edu, (612) 624-6948

² Michigan State University, East Lansing MI, USA

³ Cornell University, Ithaca NY, USA

The symposium had three primary outputs:

1. A list of practical tools and best practices based on both research and informal first hand learning by program organizers;
2. a statement of the current state of knowledge, knowledge gaps, and skill development needs; and
3. a statement of emerging opportunities and barriers to peer-to-peer learning in the future.

These three discrete outputs are still in development, with copious discussion notes in hand and awaiting analysis. One key output was the identification of nine priority themes requiring further action. These nine themes, presented exactly as articulated by the group, are as follows:

1. **How to start a new network.** Stories from experienced network leaders. How do you start one? What can we learn from those who have already started one?
2. **Gap analysis: Where (or for what audiences) is this happening and not happening?** Are there states or situations where it is not happening? Why not?
3. **How to evaluate success, including ROI, from peer-to-peer learning?** ROI estimates. Annual budgets and accomplishment reports of current programs.
4. **How should the growing WON network keep in touch?** Share stories, investigate mentorship opportunities. How can network leaders help others learn from their experiences? Develop a vision for the future of our network.
5. **What public policy changes need to be made to support this?** What changes need to be made at the state level? Federal? Other?
6. **How can we leverage other Federal (not necessarily forestry-related) programs and their volunteers?** Examples include Vista, RSVP, AmeriCorps, etc.
7. **How can elements of peer-to-peer learning be integrated into existing landowner assistance and outreach programs?** Networks related to forestry and totally unrelated (e.g. churches, etc) exist but some may not be self-aware.
8. **How can existing networks strategically grow?** What can be learned from those who have had success? What do existing networks need to grow? What are the training needs for network leaders?
9. **Research into the things we don't know about peer-to-peer learning.**

Self-selected working groups have been developed around each of these items. There's very little concrete post-symposium action to report, as the symposium ended only a week before this writing. At least some of the working groups will gather for follow-up meetings before the IUFRO Small-Scale Forestry conference, and follow-up actions and future directions will be discussed more fully in the oral presentation.

More information on the symposium, the growing network, and the activities of the action teams is available at <http://WoodlandOwnerNetworks.ning.com>. The website includes video, photo, and text symposium content as well as follow-up activities as they evolve. Anybody is welcome to join the network.

MARKETING INTELLIGENCE SYSTEM FOR SMALL-SCALE ESSENTIAL OILS INDUSTRY OF NORTH-WESTERN ONTARIO

Chander Shahi, Mathew Leitch and Serge Laforest¹

Abstract--One way of adding value to the forest resource is by identifying the widest range of products with commercial value in the forests and then assisting the small-scale industry to take advantage of the resource through improved collection, processing and marketing. A range of natural products such as essential oils, fine fragrance ingredients and other botanical extracts can be extracted from trees growing in the boreal forest, including black and white spruce, pines, cedar and balsam fir. These essential oils are extensively used in fragrances, cosmetics, aromatherapy, household cleaners and pharmaceutical products. A number of small-scale forest based industries in north-western Ontario are exploring the possibility of extraction and refinement of essential oils from boreal tree and plant species. These small-scale industries aim to target the flavour and fragrance industry all over the world. This article reviews the current situation in marketing of high-value essential oils obtained from boreal plant and tree species in north-western Ontario and develops a marketing intelligence system for the developing industry. The marketing intelligence system focuses on gathering and analyzing information about the customer, technological and competitive environment facing the small-scale essential oil's industry in the national and international markets. The industry's strengths, weaknesses, opportunities, and threats are analyzed against the political, economic, social and technological environments in these markets, in order to understand all the variables that help to guide the future product development in this small-scale industry. The basic preconditions for efficient and successful marketing of essential oils, for achieving sustainable forestry practices in north-western Ontario are proposed. This study is an effort to make the policy-makers aware of the opportunities offered by products other than wood to allow a more harmonious approach to forest resource conservation, management and utilization and thus contribute to sustainable development and environmental protection.

INTRODUCTION

The boreal forest is one of Canada's most treasured natural resources. For generations, it has been used as an anchor for many industries, and is used by various interest groups, aboriginals, and the general Canadian population. The industry which is most reliant on the boreal forest is the Canadian forest industry. This industry obtains its raw material from the boreal forest and subsequently converts it into commodity products such as lumber, pulp, newsprint, and paper. The consequence of having an economy solely based on commodities has been felt most recently, with the unavoidable downturn on the US housing market, as well as substantial

¹ Faculty of Forestry and the Forest Environment, Lakehead University, 955 Oliver Road. Thunder Bay, Ontario P7B 5E1

decrease in newsprint consumption. If the Canadian forest industry had diversified its forest industry and its products, a possibility of profit sharing and cost absorption within subsectors would have lessened the blow of an economic downturn. Fully-utilizing all parts of the tree would yield opportunities to provide a number of positive social and economic impacts. Extracting essential oils from conifer leaves, branches, bark and wood provides one such example of product diversification.

The use of essential oils has been steadily growing throughout the world. The end-uses of essential oils are as varied as the boreal landscape, which would suggest that its uses are almost infinite. Coniferous essential oils are now being utilized in many different industries, including flavours and fragrances, household cleaning products, pharmaceuticals, alternative medicines and aromatherapy, and many other industrial applications. Their use is growing mostly because of their organic and natural appeal, unique physical properties, and their irreplaceability in some products. Moreover, extracting natural products from otherwise waste forest products (forest slash) provides further economic opportunity for the Canadian forest industry. The markets for essential oils are highly dynamic, and include a series of different sectors and subsectors. For new producers, an understanding of the uses of their product and its possible markets is crucial, which helps in choosing the market with the most room for growth and provides ground for further development and success.

The objective of this study was to explore the particular niche market of Canadian coniferous essential oils within different industries utilizing these oils. Data collection for this market report followed a 'funnel' approach. Initial market research began on a broad scale, and was eventually funnelled to conifer essential oils. First, physical and functional characteristics of conifer essential oils were explored to recognize their market potential. Second, an understanding of the technologies available to produce these essential oils, with given specifications, was developed. After obtaining a comprehensive picture of the physical characteristics of conifer essential oils, their applications, and technologies involved in their production, major consumers in several large industries that utilize essential oils were identified in national and international markets. This preliminary knowledge in turn provided the direction for subsequent research on competitors, brokers and customers for small-scale industries in north-western Ontario (NWO), to understand their interests, specializations and needs. Finally, a SWOT analysis (strengths, weaknesses, opportunities, and threats) was conducted for small-scale industries in north-western Ontario, and product marketing strategies were recommended.

ESSENTIAL OILS FROM CONIFERS IN NORTH WESTERN ONTARIO

There are seven conifer trees in the Canadian boreal forest of north-western Ontario that can be used for the production of essential oils. The following section provides a short description of these species, the constituents of their essential oils, and examples of their common uses.

Balsam Fir (Pinaceae – *Abies balsamea* (L.) Mill.)

Balsam fir is a small to medium-sized evergreen conifer of the Boreal Forest. It is common throughout north-western Ontario, and grows on a wide range of mineral and organic soils. Two major oil constituents are produced from this species, namely fir needle oil and oleoresins. Fir needle oil is extracted solely from the needles, buds and cones (occasionally small live branches), and is almost exclusively used in the fragrances, aromatherapy and medical industries. Oleoresins are extracted from the bark and the wood, and are primarily used as cement,

preservative, or as fixative (base) in fragrances. The largest chemical component of the essential oils from balsam fir is pinene, and therefore it often falls in the category of “pine oils”. The other major components of these essential oils are b-pinene (36%), Bornyl acetate (15%), 3-carene (11%), limonene (11%), a-pinene (8%), camphene (6.8%). These essential oils are commonly used in the fragrance industry in cosmetics, incense candles, and electric air fresheners (electric), in other industries as sealer and clear fixative, and in pharmaceutical industries for its antiseptic and dental-sealant properties. Some common products that use balsam fir essential oils include: shampoos, gels and dyes, and pure aromatherapy products.

Eastern white cedar (Cupressaceae – *Thuja occidentalis* L.)

Eastern white cedar commonly grows throughout north-western Ontario, in association with balsam fir and tamarack. Eastern white cedar is most often associated with cool, moist, nutrient-rich sites, particularly on organic soils near streams, or on calcareous mineral soils. The two major essential oils produced from eastern white cedar are: cedarleaf oil and cedarwood oil. Cedarwood oil is by far the most commonly produced essential oil from conifer wood (over 3500 tons per year), whereas only 140 tons of cedarleaf oil are produced per year. Both these essential oils are used in a wide array of industries. The chemical composition of eastern white cedar essential oils include: thujone (65%), isothujone (8%), fenchone (8%), and sabinens (5%). These essential oils are mostly used in fragrance industries as cosmetics, soaps, candles, air fresheners, detergents and cologne, in other industries as cleaning products and insect repellents, and in pharmaceutical industries in aromatherapy and sunscreens.

Black and white spruce (Pinaceae – *Picea mariana* – (Mill.) Britton. and *Picea glauca* – (Moench.) Voss.)

Black and white spruces are widespread throughout north-western Ontario. Black spruce is found primarily in wet organic soils of peat bogs and swamps, while white spruce grows mostly on dry sites. White spruce rarely occurs in pure stands and is usually mixed with black spruce, balsam fir and trembling aspen. Black and white spruces are not extensively used in the essential oils industry. Essential oils obtained from black and white spruce include: Bornyl acetate (37%), Alpha-pinene (16%), Camphene (10%), Beta-pinene (7%). These oils are mostly restricted to aromatherapy, however, their applications extend to room sprays and air fresheners.

Pine oils: Red, white and Jack pine (Pinaceae – *Pinus Resinosa* A., *Pinus Strobus* L., *Pinus banksiana* L.)

Pines are prevalent throughout north-western Ontario, as they tolerate a wide range of moisture conditions. Essential oils from pines constitute the largest proportion of the production of essential oils obtained from boreal conifer species. Two types of essential oils extracted from the red, white, and jack pines are pine leaf oil and pine wood oil. These essential oils are used in many applications, including fragrances, detergents, chemical separation agents, degreasers, dyes, insecticides, aromatherapy, disinfectants and antiseptics. Turpentine is a major essential oil obtained from pines.

MARKETS FOR ESSENTIAL OILS

The current world essential-oils industry has been fairly stable in the past few years (Turgeon, 2001), with an estimated growth of approximately 5% per year in the entire essential oils and aroma chemicals industry until 2011 (UNCTAD/WTO, 2004) (Fig.1).

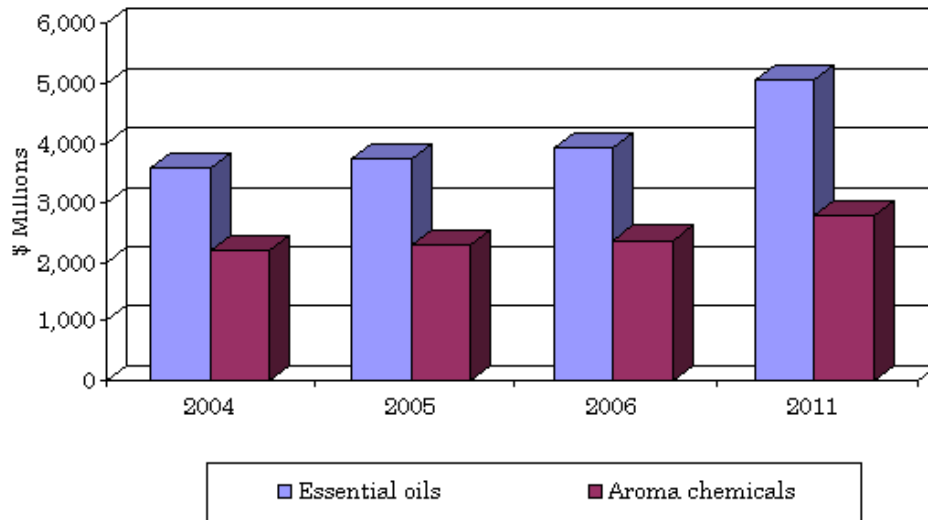


Fig.1 Essential oils and aroma chemicals market growth

A considerable amount of this growth has actually come from an increasing use of organic or natural products. The markets with the highest potential for natural essential oil products were the cosmetics and the fragrances industry (UNCTAD/WTO, 2004). Accompanying this “natural market” growth was an expectation for an improvement in the overall quality of essential oils. This could be due to improvements in technology that are expected with the rise in demand for natural products. International Trade Centre report (UNCTAD/WTO, 2004) also stated that the production of these “natural”, “organic”, or “certified” oils would provide an opportunity for the sale of these products at a considerably higher premium.

FLAVOURS AND FRAGRANCES INDUSTRIES

The flavour and fragrance industries encompass a series of industries and niche markets. Figure 2 indicates that the current world market share of flavours and fragrances is dominated almost equally by three major markets of North America, Western Europe and the Asia Pacific region (Freedonia group 2008). The shares are an indicator of the potential demand of essential oils in these regions and, therefore, marketing efforts of coniferous essential oils should be directed towards these regions.

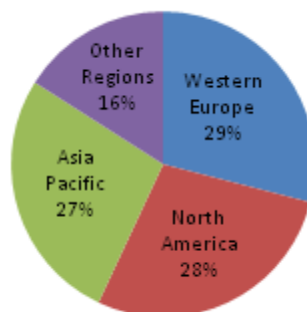


Fig.2 World market share of Flavours and Fragrances by Region

Other market regions include Latin America, Africa, Eastern Europe, and the Middle-East. Each of the three major markets appears equally important; however, they have each experienced considerably different growth over the past few years. For instance, it was reported by Euromonitor International (2001) that the Asia-Pacific region had a total market share of only 19% in 1999. Clearly, growth in this market has greatly outcompeted that of North America and Western Europe. The growth of the Asia-Pacific market (mostly India and China) is attributed to its unprecedented growth in consumer spending power, increased demand of higher quality flavours and fragrances, and changing lifestyles. This growth is expected to continue over the next few years (Ziegler 2007). The Western European market has also experienced some growth in this industry. Much of this growth was found to be within the “natural ingredients” sector of the market. A growing proportion of the European population is becoming increasingly health-conscious, which is leading to considerable changes in consumer purchasing. It is important to note that approximately 75% of global sales of flavours and fragrances are controlled by the top ten companies in the industry, and within these top 10 companies, there are four major players which dominate the market share. These large companies include Givaudan, International Flavors and Fragrances Inc, Quest International, and Firmenich.

The fragrance industry is undoubtedly one of the most important consumers of coniferous essential oils. Within this industry, the “laundry and household cleaning products” sector and “cosmetics and toiletry” sectors respectively occupy approximately 34% and 25% share of the total fragrance industry and the market share is further expected to grow at a high rate. Therefore, the supply of essential oils to these two sectors is expected to remain fairly stable as compared to other sectors of the fragrance industry (i.e. fine fragrances). There has been a considerable increase in demand of detergents for washing clothes and dishes in the household cleaning products sector. The growth of this sector has been attributed to the increase in the sale of major appliances in Western Europe and the Pacific Rim countries. The anticipated growth in the market share and the use of these detergents will most likely be quite stable and long-lasting, since new consumers in the market have begun to view these products as necessity rather than luxury. There will also be considerable growth in market share of more convenient items in this sector, such as liquid detergents and automatic dishwashing packets, due to changing lifestyles in North America, Europe, and Asia.

The air fresheners sector of the fragrance industry has also experienced considerable change in the household cleaning sector. Asia has shown the greatest growth in the air fresheners sector of the industry, with an approximate growth of 15% over the last 5 years. The greatest change in the market, however, has been due to changes in product preference of air fresheners, attributed to a change towards more environmentally-friendly and natural product alternatives. North America and Western Europe have experienced a shift away from aerosol air fresheners to electric dispensers as well as candles and oils. The fine fragrances (perfumes) sector is slightly more challenging than other fragrance sectors. This sector has been quite volatile in the demand for essential oils because of short product life cycle and product reformulation. This sector has the greatest proportion of fragrance ingredients to product ratio, which suggests that this sector acquires essential oils from a series of different sources. However, the most important point for producers of essential oils in this sector is that the premium paid for oils in this sector is much higher than in other sectors. The fine fragrances sector was dominated by Western Europe and North America, respectively occupying 36% and 32 % of total sales in the last decade. However, the development of Asian, African, and Eastern European markets was expected to fare quite

well in the future. These markets are expected to slowly take over some of the North American markets. Surprisingly the men's premium fragrances sector has shown maximum growth in this sector, although the fine fragrances sector is mostly dominated by products intended for women.

The cosmetics and toiletry sector of the fragrances industry has also grown considerably in the recent past. The cosmetics and toiletry products have increased mostly in the Asia-Pacific region, with very strong growth also in Europe and other regions. North America has, however, shown a reduction in the share of sales due to the increasing competition in pricing from a wide variety of products (Euromonitor International 2001). Some subsectors within "Cosmetics and toiletry" such as men's grooming, and skin- and sun-care products, have shown the most growth. More specialty soaps with particular scents and formulations are expected to give rise to more premiums due to their appeal to certain niche markets. A certain emphasis on anti-bacterial products was pronounced within these markets, posing an excellent vehicle of entry for possible coniferous essential oil products.

AROMATHERAPY HEALTHCARE PRODUCTS

The alternative healthcare products market has been experiencing tremendous growth within North America and Europe since the early 1990s. Research and Markets (2001) reported that aromatherapy products within the retail market in England had over \$US 100 M in sales; these sales were independent of the reported \$150 M of professional alternative healthcare services relating to aromatherapy in the year 2000. Both the retail and professional services sectors of this aromatherapy market have shown a steady increase, throughout Europe and North America. Although slight reductions in growth of the aromatherapy market was observed in the early to mid 2000s due to stricter regulations in Europe, overall market growth has been between 5% and 10%, and is expected to bounce back. An increase in the overall healthcare market is expected over the next decade in North America, Europe, and some Asian countries due to an aging population (Gray 2006). Increasing competition and product availability through health food stores also suggests a growing demand for essential oils within the aromatherapy sector.

COMPETITORS (PRODUCERS) OF ESSENTIAL OILS

There are a number of large and small-scale producers of essential oils. The size of an essential oil producer is often determined by their product variety. This means that the largest essential oil companies are those, which have the widest array of essential oil products. Having this large selection of oils allows the producer to invest in up-to-date oil refining technologies in a central location, utilize experienced in-house staff for the management of multiple oils, provide research and development that is applicable to all essential oils, have a strong network of sales and marketing department, and supply essential oils to industries that have a wide variety of needs. An example of a larger Canadian essential oils producer and distributor is Cedarome. This particular company provides a series of different essential oils to a few large companies and distributors. Cedarome produces high quality essential oils and blends, which are highly customizable, due to their investments in an up-to-date production facility and various degrees of research and development. Their ability to reproduce homogenous products that are identical to their previous batches is especially favourable for long-term contracts with large companies. It is also important to note that a considerable amount of essential oils are imported to Canada, and then re-exported to domestic or international markets. Even though large producers may have some advantages, smaller producers are not necessarily left behind. Smaller producers have a

chance to specialize in particular products, which in turn can make them fairly competitive in the overall market. Product specialization allows for the development of unique essential oil chemotypes, which is often dependent on local factors such as climate and genetics. This provides a significant advantage in the fine fragrances and aromatherapy sectors, where oil uniqueness and purity can play an important role. Also, smaller essential oil producers are often capable of adapting their business to their customer's changing needs.

BROKERS OF ESSENTIAL OILS

Within the essential oils industry, brokers are a crucial part of the supply chain between producers and customers. An involved brokerage firm can provide a wealth of opportunities to a producer, most notably during a new firm's developing stages. Brokers have existing relations with a large volume, steady and productive customers. They have access to in-house knowledge of essential oil markets. Specialized brokers of essential oils can understand the dynamics of specific oil markets, because of their well established distribution networks. They can understand and produce various quality control checks and determine the best market for a particular essential oil. However, there are obvious disadvantages to having brokers. Brokers can increase the overall sales price of an essential oil product to support more management personnel and associated facilities. This can be considered as a serious disadvantage for a firm, if other producers in essential oils market interact directly with customers. Also, adding this layer of management can lead to a slow response time to a customer demand or a new specification.

PRODUCT-MARKETING OF ESSENTIAL OILS

The immense variability associated with each essential oil product results in a wide variety of consumers. Truly understanding the chemical and functional characteristics of each essential oil, as well as the technology to modify or enhance these characteristics provides a direction for product marketing. This approach suggests that the marketing of essential oils often takes place after-the-fact, when an essential oil of particular specifications has been produced. The product-driven marketing strategies are particularly challenging if demand is less than supply, and an understanding of the strategies that competitors employ becomes increasingly important. If however, supply exceeds demand for a particular essential oil, it could force the sale of a product to less profitable markets. Further handling and processing to transform the essential oil to a more desirable form and specifications would in turn lead to higher production costs, thereby lowering profits. However, product-driven marketing strategies can also be used to the advantage of producers by consistently producing homogeneous essential oils. This helps in confidently predicting the quality of the product and thereby achieving customer satisfaction, and longer-lasting, dependable relationships with customers.

ESSENTIAL OILS PRODUCT QUALITY

It is absolutely necessary to understand the quality (purity and homogeneity) of essential oils for planning effective marketing strategies by small-scale industries. The contamination or non-homogeneity may take place at any point during production to final shipping. Improper harvesting, processing, and packaging of the oil may lead to undesired chemical pollutants entering the product. This can in turn negatively affect the oil by modifying its chemical composition or reducing its purity, and hence the value of the oil. For example, the aromatherapy sector requires the highest grade of essential oils, with lowest amounts of contaminants, and

greatest amount of homogeneity. The pharmaceutical industry, which requires high quality of essential oils, also provides a niche market for high grade essential oils. The essential oils are often reprocessed to achieve the desired chemical composition.

A slightly lower grade of essential oil than the pharmaceutical grade essential oil is required in the food and fragrance industry. This grade of oil would allow for some flexibility over contaminants (provided these are non-toxic). However, the homogeneity of the product, over a fairly long life-cycle, is rated as an important characteristic in food and flavour industry. Consistency in taste and smell also provide a greater reliance on the product for end-use customers. Air fresheners are a good example of consistency; customers tend to rely on a particular brand to provide a particular smell. The slightest change in the smell from one unit to another can render the air freshener undesirable, since it may not meet the desired customer satisfaction. This observation is equally important in the flavours as well. Homogeneity is, however, not a very stringent requirement in the fine fragrance industries. Within this industry, the uniqueness of a product is often prized. A particular grade of essential oil, which cannot be synthetically reproduced, would be of extreme value to the producer of perfumes, since there is more of a desire to achieve an 'exclusive' access to a smell. Industrial grade essential oils are often of the lowest grade. The presence of toxic chemicals in the oils is not of any particular concern in the industrial grade essential oils. In large scale industrial applications, some variation in homogeneity is also tolerated. However, much like all other grades, there are different limitations that apply to different products. Usually, there are also much less legislation and political challenges surrounding their applications.

SWOT ANALYSIS OF SMALL-SCALE INDUSTRIES PRODUCING ESSENTIAL OILS

SWOT analysis stands for strengths, weaknesses, opportunities, and threats of small-scale industries willing to produce essential oils in north-western Ontario. The strength of the essential oil producing companies is that raw materials required to produce essential oils are available in abundance in the forests. Well-developed partnerships with local harvesters ensure continuous supply of raw materials to the small-scale producers of essential oils. However, a major weakness for the small-scale producers is that properties of their essential oils remain unknown, which makes them hard to target a particular industry as they are not able to specify their product quality precisely. Steady growth in certified natural and organic product industries has ensured markets for their products, which is a big opportunity in the essential oil production sector. People are becoming increasingly aware of the natural products and non-timber forest products are being promoted by the government and environmental conservation groups. However, the producers need to use modern oil extraction methods in order to ensure product differentiation for cashing-in on this opportunity. Current economic instability, fluctuations in exchange rates, and possible variability in oil quality pose threats to the essential oils production business.

POLICY IMPLICATIONS FOR MARKETING STRATEGIES

The requirements of homogeneity and consistency of coniferous essential oils vary from one application to another. The high end markets for aromatherapy and pharmaceuticals require the production of coniferous essential oils with maximum homogeneity and minimum contaminants, the flavours and fragrances industries tolerate homogeneity to some extent, and other industrial applications are more flexible about purity and homogeneity. The distillation technologies required for the production of coniferous essential oils with high level of homogeneity and low

contaminants are very expensive, as these generate high profits with low levels of production. Therefore, a number of marketing strategies are proposed for small-scale industries, who want to enter into the established field of coniferous essential oils.

Partnering with a brokerage firm during the early stages of development would provide grounds for market penetration. Utilizing their knowledge of markets to find initial customers would provide some early networking opportunities. Joining a series of regional, national and international industry associations would greatly increase networking opportunities and product acceptance. Constantly collecting and reviewing new market information and market reports would allow for proactive planning and sustained market development. Product certification under different certification bodies would provide an excellent opportunity to penetrate the natural/organic market. The market for natural products is growing and political pressures are consistently favouring the use of these products. It would be very important to secure consistent supply of raw materials for the future. Access to a variety of species and associated volumes would provide some room for the acceptance of market volatility. The ability to reproduce samples of essential oils from bulk manufacturing processes would be essential for proactive marketing; otherwise, product-driven marketing would be forced upon the producer.

CONCLUSIONS

The essential oils market is steadily growing in all sectors. Modern society is becoming more and more reliant on the flavours and fragrances industry to provide materials to continually produce a stock of convenience products. A growing portion of the population is now no longer considering certain products as a luxury, but a requirement or need. Cosmetic and toiletry products, fine fragrances, detergents, and natural insecticides are some of the sub-sectors of the fragrances industry which are seeing considerable growth in Asia and Western Europe. Increasing legislation favouring natural products in Western Europe, and eventually North America, will increase the dependence on natural essential oils within the flavours and fragrance industry. At the same time, product certification is also being increasingly recognized in many sectors of the industry. Since the flavours and fragrances industry is a very broad embodiment of a series of smaller industries, further filtering of the data was essential to isolate market information of the conifer essential oils from citrus, herbs, and vanilla oils.

It was found that the essential oils are used in a wide variety of industrial applications. Market research was then focused on the industries that would consume a considerable amount of coniferous essential oils. The identification of these industries and the subsequent determination of their specific needs in turn provided more inroads into the niche market of coniferous essential oils. This helped in ascertaining the role of competitors, brokers, commission agents, and final consumers of coniferous essential oils. The identification of Canadian producers of coniferous essential oils not only provided general information of their target markets, but also provided an indication of the export market share of Canada. Although, most of this market research was driven by internet searching, personal contacts with various parties helped in providing the right direction for generating this marketing intelligence information for coniferous essential oils.

Overall, the markets of products that utilize coniferous essential oils are expected to show considerable growth. Each market sub-sector has its own growth dynamics, with some particular sub-sectors fairing much better than others. Therefore, there is a need to identify and concentrate marketing efforts on particular sub-sectors, which would be expecting considerable growth.

Furthermore, an understanding of the particular geographical distribution of this market growth is crucial to establish a niche market for each coniferous essential oil. The greatest growth potential for products with coniferous essential oils was found to be in Asia. An increasing disposable income amongst the overall population and changing lifestyles have led to the increased purchasing power of more cleaning products and luxury materials. Also, an increase in sale of major appliances has led to the development of a dependence on the new household cleaning products. In North America and Western Europe, an increased demand of more “natural”, “organic” or “certified” products has led to the considerable increase in demand of essential oils. Providing more certified organic or natural oils to an ever-growing market of environmentally friendly products would provide an excellent growing market for any producer. The detailed list of producers, brokers and consumers in different regions of the world is available with the authors and may be obtained on request.

REFERENCES

- Euromitor International. 2001. Flavours and Fragrances – World. www.euromonitor.com Verified March 20th, 2009. 138pp.
- Freedonia group. 2005. Industry study: forecasts to 2008 & 2013 for 17 countries & 6 regions. <http://www.freedoniagroup.com/brochure/18xx/1886smwe.pdf>. Verified March 20th, 2009.
- Gray, Nicole. 2006. Changing Landscapes: A Special report on the World’s Top 50 Pharma Companies. <http://pharmexec.findpharma.com>. Verified March 20th, 2009.
- Research and Markets. 2001. Alternative Healthcare Market Assessment. http://www.researchandmarkets.com/reports/3484/alternative_healthcare_market_assessment. Verified March 20th, 2009.
- Turgeon, Mélanie. 2001. Profil Des produits Forestiers Première Transformation – Huiles Essentielles. Ministère des ressources Naturelles. Sainte-Foy, Québec. <http://www.mrnf.gouv.qc.ca/publications/forets/entreprises/Huiles.pdf>. Verified February 8th, 2009.
- UNCTAD/WTO. 2004. Marketing Manual and Web Directory for Organic Spices, Herbs and Essential Oils. http://www.intracen.org/mds/spices_manual.pdf. Verified March 21st, 2009.
- Ziegler, Herta. 2007. Flavourings: Production, composition, applications, regulations. Wiley-VCH. Weinheim, Germany. 229pp.

MAKING FORESTRY SUSTAINABLE: RECENT ISRAELI INNOVATIONS IN EUCALYPTUS FARMING AND CARBON SEQUESTRATION

Alon Tal¹ and Ben Gurion²

Abstract--At the turn of the twentieth century, the land of Israel was almost entirely devoid of vegetation and largely desertified. During the past sixty years, afforestation has transformed the local landscape, with forests planted and planned on 10% of the country's lands – much of it semi-arid with less than 300 mm. of annual precipitation. Originally, the trees selected by the KKL (the national forestry agency) were predominantly Aleppo pine and other conifers, planted in dense stands. Yet pragmatic, aesthetic and ecological considerations have led to today's diverse and more dispersed Mediterranean stands. Although the country's first generation of foresters hoped to establish a successful commercial timber industry, recreation and ecosystem services soon came to dominate forestry objectives and public policy in the field. Recently, however, commercial forestry initiatives have begun to emerge. In areas where low productivity due to salinized and waterlogged soils led to the abandoning of farmlands, small farm operators are now engaged in a eucalyptus initiative on marginal lands, which has generated reasonable profits in lumber sales and in support of bee keeping. Given Israel's status as a "developing country" under the Kyoto Protocol, forests' economic potential through carbon sequestration has been explored, but has not yet proven to be compelling. Nonetheless, as the trees planted in Israel's semi-arid regions, surprisingly, exhibit carbon sequestration properties comparable to forests in temperate Europe, the potential for offsetting may become a growing factor in local forestry policy.

INTRODUCTION

Israel's forestry experience is unique not only in the Mediterranean and Middle Eastern context but globally. In much of the country, newly planted trees have literally transformed a land that for centuries was largely denuded of vegetation. Historically, much of the motivation behind Israel's forestry policies was linked to its broader efforts to combat desertification and implement sustainable soil management practices. Yet, questions about the sustainability of Israel's forests themselves, given the country's climatic constraints, are frequently raised. In this paper, the major stages in the evolution of Israel's forestry policies -- as the country aspired for a more sustainable strategy -- will be briefly reviewed. Even as the discourse regarding sustainable forestry tends to emphasize ecological balance, economic viability is a key pillar of any sustainability equation is rarely part of the policy discourse. In this context, two recent related economic possible initiatives associated with Israeli forestry will be discussed.

¹ Alon Tal, Mitrani Department of Desert Ecology alontal@bgu.ac.il

² Ben Gurion University of the Negev and Chairman of the Land Development Committee, KKL, Israel.

A BRIEF HISTORY OF FORESTRY IN ISRAEL

While the degraded condition of Israel's landscape during the first half of the twentieth century is well documented by aerial photographs, descriptions by travelers provide a more evocative picture on the ground. Among the more notable of these is Mark Twain's 1867 travel log, ultimately published as *Innocents Abroad*. In it he describes the Galilee landscape to be: "*as bald and unthrilling a panorama as any land can afford perhaps was spread out before us.*"

Regarding the state of the local woodlands he explains: "*There is no timber of any consequence in Palestine - none at all to waste upon fires - and neither are there any mines of coal*". And of the hills surrounding Jerusalem "*There was hardly a tree or a shrub anywhere. Even the olive and the cactus, those fast friends of a worthless soil had almost deserted the country. No landscape exists that is more tiresome to the eye than that which bounds the approaches to Jerusalem.*" (Twain, 1996)

Today Jerusalem is surrounded by newly planted forests and the Galilee is largely green. Ten percent of the country's 22,000 km² of land is designated to be forests, most of it on semi-arid and arid lands. Clearly, there is an interesting national story here.

Institutionally, management of the Israel's forest is conducted by the public corporation Keren KaYemeth L'Yisrael (Jewish National Fund – hereinafter: KKL) rather than by a government agency. The KKL was involved in land reclamation, agricultural development and afforestation during the first half of the twentieth century. Rather than creating a new government agency after the country gained independence, the KKL retained responsibility for tree planting in 1949 and has served as a de facto and de jure forestry agency ever since. (Tal, 2006). The KKL owns 13% of Israel's lands, many of which it leases at considerable profit, and it operates a strong international fundraising network in over twenty countries. Consequently, Israeli forest programs enjoy a relatively prosperous, stable and independent source of funding. This affects policy maker's economic perspective and has led to the primary focus on recreational, ecological and natural heritage objectives in the country's forestry strategy.

During the 1950s, tree planting, especially in areas that were inappropriate for agricultural cultivation provided employment for tens of thousands of refugees, and was consistent with the "pioneering spirit" of the period. Forestry enjoyed political support from the highest levels. In a speech to the Knesset, Israel's Parliament, in 1951, David Ben Gurion, the country's founding Prime Minister called for "*many hundreds of thousands of trees on an area of 500,000 hectares, a quarter of the area of the state... We are a state at the beginning of repairing the distortion of generations, distortion that was done to the nation and distortion that was done to the land.*" (Weitz, 1970).

The reasons for the country's passion for tree planting have evolved over time beginning with nationalism and ensuring Jewish sovereignty over lands it purchased (Cohen, 1995), providing employment for immigrants (Segev, 1986), and of course more recently recreational opportunities as well as ecological restoration. Eventually, 260 million trees were planted, with stands located in semi-arid areas with as little as 250 mm. of rain per year – a precipitation level generally considered too modest for dense forests. (Tal, 2003). In fact, Israel has successfully created conifer forests in these regions with full canopy cover.

For most of the country's history, Israeli forests were dominated by conifers, in particular, the Aleppo pine or as it is locally called: "Jerusalem Pines" (*Pinus Halepensis*). During the early

twentieth century, when KKL foresters were experimenting with different species, Jerusalem pines consistently "out performed" the indigenous oak trees. By 1938, 98% of the trees planted by the KKL were *Pinus Helepnensis*. Four of the tree's advantages commonly cited by the country's first generation of foresters were: 1) its climatic versatility; 2) its ability to thrive in a variety of soils, including rocky lands; 3) the ease of planting and cultivation; and 4) its rapid growth rate. (Tal, 2006).

The country's nascent ecological community, however was hardly enamored with the conifers and was vociferous in its critique of the new monocultures, arguing that it was supplanting natural habitats and unpleasant aesthetically for visitors. Eventually, nature resolved the debate. Forestry plantings began to change as a result of the decimation of trees by pests, in particular an aphid known locally as the Jerusalem pine blast (*Matsucoccus josephi*) that thrived on the newly planted tree species. With 70% losses in some forests, a new approach became imperative. More diverse plantings soon became the norm, with foresters preferring broad-leaf Mediterranean species, which grew more slowly, but were better able to withstand local insects and fungi. Today these woodlands support a rich variety of wildlife and support myriad picnic sites, playgrounds as well as excellent hiking and mountain biking trails

Individual tree species enjoyed statutory protection since the British mandate. (Avni, 2007) With the promulgation of a National Master Plan or "NMP 22" on November 16, 1995, conservation went a step further. The plan finally formalized both the borders of the countries' forests and the makeup of the varying stands. (Israel Ministry of Interior, 1995) The plan establishes formal zoning designation for some 200,000 hectares of forests -- one tenth of the nation's lands based on ecological and recreational criteria: "*The detailed planning of the forest in these areas will be made on the basis of the natural data concerning the entire area, taking into consideration preserving the landscape characteristics, the environment and the appearance of the land.*" To date, some 30,000 hectares of land, designated as forests of one sort or another remain to be planted. Most of the available reserves are located in Israel's southern drylands – the Negev desert.

Although the statutory foundations for forestry in Israel is archaic, based on a 1926 Ordinance, from the British Mandate, forestry activities and protocols are generally modern and often innovative. The country's forestry program relies on ongoing research which drives management practices. For example, a recent study showed that despite traditional tendencies for planting of saplings during the peak of the winter-time, when soils reach their highest level of saturation due to the seasonal winter rains, success rates among autumn plantings were far higher. (Litminovich, 2008) As a result, planting schedules have been modified. Tree planting in semi-arid zones which used to be extremely crowded (4000 to 6000 trees / hectare) now begin with roughly 1000 saplings/hectare which are subsequently thinned, with 350 to 400 trees / hectare a typical survival rate.

The primary reason for the high level of tree density in early stands was ingenuous aspirations to establish a timber industry in Israel. While such crowded woodlands might be unpassable for hikers, they were thought to increase the profitability of what were essentially "tree plantations". (Orni, 1969). With time, however, recreational and ecological objectives came to dominate Israel's afforestation strategy. When a new sustainable forestry policy was approved by the KKL board in 2006 it acknowledged that sustainable development should allow for "economic utilization of forests and of other areas planted with trees". Yet, the profitability of tourist

concessions and the contingent value assessed to the recreational experience of millions of forest visitors were deemed far more significant economically. “*Even if Israel’s timber industry does not constitute a primary goal for the KKL’s afforestation program, maximum profits from marketing wood should be generated by way of sustainable forest management that supervises lumbering and pruning.*” (KKL, 2006)

In practice, by the start of the 21st century timber yields exceeded 100,000 tons per year, having increased steadily throughout the years. (KKL, 1997) Roughly 40% of the wood comes from thinning activities, another 40% comes from falling conifers and the remaining 20% from eucalyptus trees. This provides about 10% of domestic wood production and considerable heating materials for Israel’s Bedouin and Arab communities. While such production is far from trivial, Israeli forestry policy has long ceased to be driven by timber production considerations. Any profits generated, are accrued by KKL such that until recently, tree planting was not considered to be a meaningful, private sector, economic venture.

Nonetheless, recently new economic initiatives have been assessed that are associated with Israel’s forests. Two of particular interest are carbon sequestration through afforestation, for sales as carbon credit on international markets, and the planting of eucalyptus tree farms on degraded farmlands.

COMMERCIAL EUCALYPTUS PLANTING

The first eucalyptus seeds were sent to Palestine in the 1880s from Australia. Because of they grow so quickly and are effective as a “biological pump” in drying swamps, eucalyptus were very fashionable and during the early twentieth century became part of the landscape, especially in areas of Israel that sought to “reclaim” local wetlands. (Weitz, 1970) After a periodic dip in their popularity, in recent years, the tree has been pressed back into service as the country’s first substantial private commercial forestry venture.

Israel’s bee-industry is highly successful, providing honey, pollination and medical services. Eucalyptus offers a solution to the pervasive absence of substantial flowering among indigenous plants during the months of December, January and February, before the warmer spring season. Other eucalyptus trees flower during the hottest summer months as well (August, September), when there is a shortage of flowering flora. It is not unusual to see swarms of bees around eucalyptus trees during this period when they are flowering.

Because they are often the only flowering plants during a particular period, the specific economic contribution of eucalyptus trees is relatively easy to assess. Lupo and Isaacovitz (1987) for example found that *Euc. erythrocorys* has a four day flowering burst during which it can discharge 4.1 ml of nectar with a sugar concentration ranging from 9 – 14%. With adult trees sporting 2000 flowers when in season, a single tree can generate an average of 8 liters of nectar annually, commensurate with roughly 1 kg. of sugar. Given the conventional tree density in planting, a hectare of these eucalyptus can produce between 250 -600 kg. of sugar. Honey contains 81% sugar, bringing potential honey production to roughly 310 - 600 kg per hectare per year. Because during the month of August, there is practically no alternative flowering, the tree serves to extend productive capacity into the summer season. The price of honey is relatively steady in Israel with bee keepers typically receiving \$3.30 / kg. for barrel. (Arnon, 2009) The numbers add up nicely for entrepreneurial farmers.

The planting of eucalyptus tree for timber only emerged after Israel's farming sector underwent an economic crisis during the 1980s, and a low maintenance, unirrigated crop which can thrive on salinized land was sought. Because it grows so quickly, eucalyptus has always been raised commercially in a variety of developing countries for construction lumber, particle board and biomass for energy. Trees can be harvested after a period of ten years and frequently earlier. (Zohar, 2009)

Due to the high density of the wood, eucalyptus is generally of high quality, meeting the European wood standards which Israel has adopted. The two Israeli lumber producing facilities that are interested in purchasing eucalyptus trees estimate their annual capacity for eucalyptus at 100,000 tons each. This corresponds to a potential of roughly 10,000 hectares of farmland. . Until now, eucalyptus wood utilization in furniture production has been modest. As there is a global (as well as a local) trend to move timber production from natural forests to tree plantations, this may change.

The trees have proven to be particularly popular among farmers' whose lands suffer from water logging and/or salinization. Due to ill-advised irrigation practices, high water tables, water logging and salinization are a global scourge that undermine agricultural productivity in developed and developing nations alike. (Konukcu, 2006). Given the high costs of drainage, (especially sub-surface) eucalyptus trees have proven to serve as a successful biological pump for decades, drawing down ground water so that salinization of soil is averted. Hence, lands which are not fit for most crops can successfully grow eucalyptus with reasonable yields and profits, while at the same time contribute to hydrological restoration.

There is often a conflict in these two different eucalyptus tree functions in terms of harvesting. While trees planted for timber are harvested as early as possible, the eucalyptus trees only start to produce flowers after several years and longevity is essential for nectar production. Frequently, farmers will plant two species together, harvesting the individual trees from the flowering species which are not productive. In practice, today some 100,000 saplings are distributed in Israel to local bee operations annually and 200,000 for eucalyptus tree farms. The primary eucalyptus species utilized for lumber are: *Euc. camaldulensis*, *Euc. gomphocephala*, *Euc. cladocalyx*, *Euc. maculta*, and *Euc. urograndis*. Bee hive operators prefer *Euc. torquata*, *Euc. torwood*, *Euc. striklandii*, *Euc. erytrocorys*, *Euc. gomphocephala*, *Euc. occidentalis* and, *Euc. leucoxyton megalocarpa*. (Brand, 2009)

CARBON SEQUESTRATION

Afforestation in Israeli drylands, has proven itself to be sustainable, notwithstanding the harsh climactic conditions. For instance, *Yatir*, Israel's largest forest, located in the northern Negev region, is comprised largely of pines in an area which receives a paltry 280 mm of rain each year. Until recently, it was assumed that such afforestation initiatives would contribute little to carbon sequestration efforts. Research at the Yatir research station suggests that, contrary to prevailing botanical theories, this dryland forest is as efficient in sequestering carbon as those in more temperate regions. On average some 2.5 to 2.6 tons of carbon/hectare are sequestered – comparable to the European average of 2.7. (Grunzweig, 2007) When the region had a rainy year, the carbon levels reached 3.5 ton/hectare.

Possible explanations for the high sequestration performance involve the ability of the trees to absorb carbon dioxide without opening pores excessively, which would compromise the tree's water balance, through evaporation. Presumably, the increased CO₂ in the atmosphere makes it easier for trees to efficiently absorb CO₂. In addition, the conifers planted are specially selected for their ability to thrive under drought and relatively saline conditions.

Since the inception of the United Nations Framework Convention for Climate Change (UNFCCC) Israel has been categorized as a “*developing* country”. Among the implications of this status is Israel's ability to serve as a site for a Clean Development Mechanism (“CDM”) projects, in which carbon reduction or sequestration activities can be sold to *developed* countries credits who can add the credits onto their carbon ceiling “cap”. Indeed, Israel entrepreneurs have pursued a variety of CDM projects from methane capture in landfills and dairies to increased industrial efficiency. (Israel Ministry of Environmental Protection, 2009). Accordingly, the potential of afforestation activities appeared to constitute an economic commodity was raised whereby planting of forests could be offered as another item on international carbon markets. Indeed, in the Pearl River Basin in Guangxi province, China, the first CDM credit was granted to a 2000 hectare reforestation initiative which restored cleared and eroded lands. Trees planted there included pine, liquidamber and eucalyptus. (Carbon Positive, 2006) Nevertheless, a closer look at the rules and limitations imposed by the UN convention on forestry “sink” credits, led to a decision in Israel not to aggressively pursue a commercial carbon sequestration strategy based on trees. The economic calculus was not favorable. To begin with, the costs of certification are considerable. In 2004, the World Bank's Carbon Finance Business estimated an expense of \$100,000 for up-front transaction costs for “PDD” preparation, project negotiation, and validation; \$20,000 in verification costs each 7 years, and a discount rate of 12%. (World Bank, 2004)

Moreover, the actual prices on the market for credits based on afforestation and reforestation tend to be far lower than for other carbon reduction project and planting trees has been excluded from the European Emissions Trading System (Kruger, 2004). The relatively temporary nature of the credit is part of the reason for the lower value. As trees may die or burn, the carbon sequestered is not considered as “permanent” nor is any achievement deemed as final in contrast to other means. Accordingly, for afforestation and reforestation CDM projects, the project implementers may choose between a fixed thirty-year crediting period and a twenty-year period that may be renewed twice. This may allow for smaller-area plantings to be financially viable.

At the same time, it is not clear that the 30,000 or even 20,000 hectares are available for forest-density planting. To begin with the UNFCCC requires clear standards for “additionality”. In other words, new plantings must sequester more carbon than pre-existing baseline levels. Most of Israel's lands that are appropriate for future afforestation are either already planted or have already been “designated” as forests, which disqualifies them under the additionality criterion. Forest maintenance, of course, cannot qualify for credits. Neither will UNFCCC will allow credits for reforested trees that have been planted before 1989 and afforested trees planted during the past fifty years.

Moreover, forests are narrowly defined under the UN rules and must have a crown cover of 10 to 30% or equivalent stocking level. (Enderlin, 2007) This density is met by the aforementioned, traditional KKL conifer plantings like those in Yatir and Biriyya forests, but do not exist in many of Israel's newer stands where the management plan calls for the low density “savannization”.

The UN also requires that those forests receiving credits be of reasonable size. Accredited forests are to sequester a quantity of CO₂ greater than 8000 tons /year over a 5-year period. The UN also allows for smaller scale forestry projects, but these must be implemented by a low-income local community or individual. Ultimately, there remains great uncertainty about the adequacy of land available for *new* afforestation, especially as new forests have to go through a formal approval process in Israel's planning system which can take years, especially if there is public opposition to a program.

Nonetheless, informal offsetting for new plantings has been enacted as a fundraising gimmick. In the future, as Israel takes on "Annex 1" developed status and adopts a carbon ceiling, afforestation may become integrated into a national carbon reduction action plan.

CONCLUSIONS

Israeli forests, largely located in drylands, have transformed the country's landscape. Initial hopes for a prosperous timber industry, however, appear to have been ill-advised. The pervasive water scarcity and poor soils were simply too overwhelming. Israeli forests will continue to provide recreational opportunities for millions of Israelis and offer habitats to wildlife. Only recently, has the ability of tree growing to contribute to the local economy (beyond its present role as tourist infrastructure) been reconsidered.

Recent experience with fast growing eucalyptus tree has contributed to the local lumber market and served as a valuable source of nectar and pollen for bees. There is reason to anticipate that eucalyptus groves and plantations will expand during the coming years. At the same time, while carbon sequestration through afforestation has been assessed, to date it has not materialized as a serious economic resource. Notwithstanding the emergence of world carbon markets and Israel's potential as a host for a forestry CDM project under the Kyoto Protocol, the additionality criteria, forest definitions, and the potentially ephemeral nature of carbon sequestration make it difficult to overcome the legitimate demands of the U.N. standards. Yet, given a range of conifers exhibiting high sequestration rates, even in arid climates, afforestation may yet become a modest commodity in the world's carbon market just as it may contribute to Israel's future efforts to meet its international responsibilities in green house gas reduction and sequestration.

REFERENCES

- Avni, Zvi (2007) "The Protection of Trees under Israeli Law", *Forestry* (In Hebrew) vol. 9 3-8.
- Brand, David (2009) KKL acting director of research, personal communication.
- Carbon Positive (2006) First CDM Reforestation Project Registered,
<http://www.carbonpositive.net/viewarticle.aspx?articleID=474>
- Cohen, Shaul Ephraim,(1995) *The Politics of Planting*, Chicago, University of Chicago Press.
- Dag, Arnon, Itzkovtitz,, Dini, (2009) "The Benefits of Flowering Eucalyptus to Bee Production", *The Eucalyptus Book*, (Weinstein, et. al., ed.) (at press).
- Enderlin, Martin (2007) UNFCCC, "A/R Activity Eligibility Test," 21 Jan. 2007, at http://cdm.unfccc.int/public_inputs/Eligibility_lands4AR_PA/cfi/A1LQ5WNJ8RVFLJZDNBG8S47J1OBT8A
- Israel Ministry of Environmental Protection (2009) CDM Projects in Israel, www.sviva.org.il.

- Israel Ministry of Interior, (1995) Planning and Building Law, 1965 -- National Master Plan for Forests and Forestry, (In Hebrew) Submitted to Government, Ministry of Interior, Jerusalem, August, 1995. Published in Yalkut Pirsumim, Number 4363, December 19, 1995.
- KKL, Land Development Authority, (1997) 1996 Annual Report, Jerusalem, Keren Kayemet L'Yisrael, July, 1997, 18.
- KKL (2006) KKL Afforestation Objectives: The Preservation of Diverse and Sustainable Forest That Offers Services to the Public, www.kkl.org.il.
- Konukcu, F., Gowing, J. W., Rose, D. A., (2006) Dry drainage: a Sustainable Solution to Waterlogging and Salinity Problems in Irrigation Areas? *Agricultural Water* 83, 1-12.
- Kruger, J, Pizer, W (2004) Greenhouse Gas Trading In Europe, The New Grand Policy Experiment, *Environment* 46, (8) 8-23.
- Litminovich, Zohar, Friedman, Alex, Hatma, Tamara, Katznelson, Michal,(2008) The influence of early planting on the sapling success rate and the development, *Forestry*, (In Hebrew) vol. 10 June, 2008, 35-37.
- Noy-Meir, Imanuel (1989) "An Ecological View point on Afforestation in Israel: Past and Future," *AFZ* 24-26.
- Efraim Orni, (1969) *Afforestation in Israel*, Jerusalem, Sivan Press, 4.
- Segev, Tom (1986) *1949 The First Israelis*, New York, The Free Press, 117-129.
- Tal, Alon (2006) *The Environment in Israel: Natural Resources, Crises, Campaigns and Policy from the Advent of Zionism until Twenty-first Century*, (in Hebrew) B'nei Brak, HaKibbutz HaMeuhad Press,2006, chapter 4 "A Forest with Different Shades of Green".
- Tal, Alon (2003) *Pollution in a Promised Land, an Environmental History of Israel*, Berkeley, University of California Press, 69-113.
- Grunzweig, J.M., I. Gelfand, I, Y. Fried, Y. Yakir, D., (2007) Biogeochemical factors contributing to enhanced carbon storage following afforestation of a semi-arid shrubland, *Biogeosciences*, 4, 891–904,
- Twain, Mark (1996) *The Innocents Abroad*, New York: Oxford Press, 481, 495, 555
- Weitz, Yosef, (1970) *The Forest and Aforestation in Israel.*, (In Hebrew) Ramat Gan, Masada, 295.
- World Bank Carbon Finance Business (2004) "Small-Scale Afforestation and Reforestation Projects," in "Simplified Modalities and Procedures," 7 April 2004, page 29, at <http://unfccc.int/resource/webdocs/2004/02.pdf>.
- Zohar, Yehiel, Gaphne, Avi, "Eucalyptus as the Central Component of a Forest Farm", *The Eucalyptus Book*, (Weinstein, et. al., ed.) (at press).

BENEFITS OF RESTORING DEGRADED FOREST LANDS IN GHANA

Tapani Tyynelä¹, Damnyag, Lawrence; Appiah, Mark; and Pappinen, Ari

Abstract--The current deforestation rate in Ghana causes huge social, economical and environmental problems. Because of heavy dependency on biomass, rural populations are obliged use too much their forest resources and agricultural residue. Current agricultural practices, including pastoral farming and cutting for biomass are amongst the fundamental causes of major environmental problems. Also the degradation of the environment by wildfires has made woodlands turn into grasslands and food productivity and medicinal plants decrease.

The West African state lost 1.9 million hectares or 26 percent of her forest cover in the last 15 years. The most recent study of Africa's vegetation changes, estimated 3% per year deforestation rate for Ghana. Community involvement in forest landscape restoration continues to receive increased attention in Ghana and Africa as a whole. This paper discusses preliminary findings of the forest policy research project in Ghana funded by the Academy of Finland. The project was designed to improve utilization of indigenous tree species, with mahogany as an example, in forest rehabilitation and landscape restoration in Ghana. The technical and organizational capacities of communities are also considered.

The paper deals with the deforestation causes (e.g. poverty driving agriculture, lack of alternative rural wage employment and role of the timber industry) and assesses the dependence on forest resources among rural households. Illegal logging and Ghana's Voluntary Partnership Agreement with the European Union are other important issues in the paper.

INTRODUCTION- FORESTS IN GHANA

Ghana has one of the stronger economies of sub-Saharan Africa due to its array of natural resources. Traditional land uses in this Western Africa country include small and large scale farming, forestry, wood fuel, cattle grazing, tree plantations of exotic and indigenous species (cocoa, rubber, timber), and game/park reserves. Most of Ghana's 238,500 km² (92,100 mile²) land area is covered by savannah (56%) or closed forest (35%). All the vegetation types in Ghana, except for those comprising the savannah, are considered tropical forests and play very important role in supporting the livelihood of 21 million Ghanaians, particularly, the rural communities (Blay *et al.* 2007). However, the combined effect of over-exploitation of forest resources, unsustainable farming practices, bush fire and mining activities have significantly reduced the forest area and degraded nearly 32% of the reserved forest and over 70% of forests outside reserves (Ministry of Lands and Forestry 1996). The Government of Ghana has taken a

¹ The Finnish Forest Research Institute, P.O. Box 44, 69100 Kannus, Finland, Europe, email: Tapani.Tyynela@metla.fi, Tel. +358 10 2113417

series of measures to cope with deforestation, including a ban on all exports of raw logs. Ghana has set aside 16 per cent of its total area of forest land for wildlife and plant reserves, and has restricted logging licences outside these reserves (Oxfam 2008).

The average density of many important timber species is now low in all forests. For example, African mahogany (*Khaya ivorensis*), the selected species for study in this paper, is sometimes less than one commercial tree per ten hectares (Lamprecht 1989) in the primary forests and has even been suggested to in near future (Alder 1989). Continued forest loss which is currently at an annual rate of 3% threatens the existence of such indigenous tree species and associated biodiversity through habitat loss, the potential lack of gene flow as a result of fragmentation (Novick *et al.* 2003) and the increasing processes of soil erosion (Stoorvogel and Smaling 1990) affecting agricultural productivity on which the livelihoods of rural people depend (Abeney and Owusu 1999). Sustaining the populations of the species and the value of the forest is a matter of increasing concern for not only Ghana but the entire West African region.

DEPENDENCE ON FOREST RESOURCES: BUSHMEAT AS AN EXAMPLE

Forest degradation causes losses of timber tree species with high economic value. However, it is more difficult to measure what losses it causes for non-wood forest products (NWFPs). For poor households in developing countries, NWFPs are rarely the primary source of revenue, but can supplement income or lessen unexpected hardships such as the loss of crops. Bushmeat is among the most important forest products in many parts of Africa. For example in the Democratic Republic of Congo (DRC), consumption of wild foods increases significantly during the lean season (pre-harvest time), particularly bushmeat, where consumption rose on average by 75% (De Merode *et al.* 2004). The bushmeat represents "superior goods". Bushmeat consumption increased exponentially with increasing wealth. By contrast, wild plants were "inferior goods" so that increasing wealth implied decreasing household consumption in DRC (De Merode *et al.* 2004).

In Ghana wildlife is not consumed as a luxury good but as an essential source of protein (BBC 2004). The absence of a developed domestic livestock industry delivering fresh produce to markets is a major problem. One possibility would be to introduce some small-scale animal husbandry projects to produce livestock that would fill the gap from less bushmeat being available in the market (BBC 2004). Bushmeat is a delicacy for most Ghanaians and they will hunt for bushmeat as long as there is some wildlife to hunt. There are few barriers to hunting in Ghana, as the investment costs are relatively low by (shotgun and ammunition and/or snares) -to which must be added transport costs, as most hunters sell direct to the urban market (Brown 2007).

Hunting bushmeat is also profitable business in Ghana. Hunters earn comparable salaries to civil servants, or 8.6 times the earnings of Government labourers (see Mendelson *et al.* 2004). In another study hunter income was similar to that of a graduate entering the Wildlife Service, and 3.5 times the government minimum wage (Brown 2003). Hunting is a livelihood opportunity that has low entry costs and can be undertaken flexibly throughout the year. For this reason, it is particularly attractive to young adult males with limited social and agricultural responsibilities. Alternative livelihood options for this category of the population are unlikely alone to reduce hunting pressure unless they offer superior benefits to them, and successfully compete for their

labour time (Brown 2003). Bushmeat trade provides income not only for the hunter but also for women retailers (Ntiamo-Baidu 1987).

DEFORESTATION CAUSES

The closely-linked agents of forest change activities are not mutually exclusive. According to Dabebo and Shinohara (1999) these include: permanent and subsistence agricultural practices; wildfires; activities of formal and informal primary timber industries; mining and quarrying; and plantation strategies and *taungya* practices. The indirect or underlying causes of deforestation and forest degradation in Ghana are grouped by World Rainforest Movement (1999) under categories namely: population growth, poverty, distribution of royalties and other benefits, difficulty of obtaining permits, misguided policies of Government, Structural Adjustment Program and Foreign Aid, international trade and global economic situation. The following actors were identified as being responsible for the underlying causes of deforestation and forest degradation: farmers, forest-edge dwellers and concession holders; traditional authorities and government agencies and the international community (World Rainforest Movement 1999).

The old ways of hunting animals by starting bushfires to scare them out of their natural habitats - has prompted environmentalist concern (BBC 2006). These brushfire practices have been very common and causes deforestation. The Ghanaian government launched a US\$ 23 Million program to establish livestock farming that could provide alternative food sources and income to bushmeat in 2002. Local chiefs joined the government bushmeat campaign. Leaders of the Ashanti clan, Ghana's largest, have taken the most far-reaching action, banning all hunting of totem animals as well as the use of toxic chemicals, automatic rifles and bush burning for hunting—all of which have contributed to species declines (CEPF 2003).

Ntiamo-Baidu (1987) warns that the attitude of the general West African public, that wildlife must be used as long as it is available, hampers the implementation of conservation policies. There is a major need for intensive general wildlife conservation education, to remind the people of the importance and value of wildlife. Over-exploitation must be replaced by programmes of improved management and increased sustainable production (Ntiamo-Baidu 1987).

The Government of Ghana has also been accused for deforestation. According to Mayers and Nii Ashie Kotey (1996) the government's agricultural policy has been a driving force of forestland conversion. The trend is legal, intentional, and arguably necessary for economic development. Official estimates suggest that logging in Ghana is about 4 millions m³/year (or four times the sustainable rate) and the logging industry has capacity that is six times bigger than the sustainable rate (Birikorang 2001). For instance, by 1999 Ghana's timber processing capacity had increased to 5.2 million m³ and is now reported to be as high as 7.0 million m³. With this under-utilized capacity the hope is to promote Ghana as a regional processing hub producing superior quality products. However, the success of this depends on adequate volumes of logs being available, but this may not be a realistic possibility.

Other regional log sources are Liberia, which is estimated to have an annual allowable cut of only 800,000m³, and the forested nations of the Congo basin, which are reportedly reluctant to sell logs to Ghana, preferring instead to develop local processing capacity. Furthermore, there is competition for available timber supplies within the West African region and increasingly from further field, particularly China and India (Blackett and Gardette 2008). These findings indicate

that there is growing demand from India for teak and China for logs or rough-sawn lumber, and that the Indian and Chinese buyers are widely rumoured to be complicit in illegal activities. This action can seriously undermine the VPA process and the EU is therefore urged to strive for cooperation with India and the China to put an end to their alleged involvement in the illegal timber trade to enhance the VPA processes.

Confronted with these challenges, coupled with an average (and declining) log-use efficiency of 37%, Ghana's timber industry simply cannot afford to import logs at international market prices. With the domestic resource on its last legs, there is pressure on companies to cash in while some resource remains. Perhaps a better option to arrest the declining forest resources would be to scale down the industry to match available resources.

Revenue distribution between communities and the Forestry Commission and the local authorities is sometimes unfair. Ghana's constitution provides a formula distributing revenue accruing from stool lands (lands owned by pre-colonial communities, symbolised by wooden stoles). It says that shares of royalties should go to District Assemblies (55%), stools (25%) and traditional authorities (20%). The Forestry Commission ignores this constitutional provision when it officially appropriates even 60% of revenue deriving from forests as "management fees" (FERN 2006). This sharing arrangement has recently been reviewed, making the Forestry Commission take 50% of the royalties accruing from forest reserves as a management cost for the forest resources it manages on behalf of the communities (Owusu *et al.* 2008).

Traditional authorities are also stools. Therefore, chiefs can decide themselves how they use stools' royalties. None of these institutions are accountable to forest-owning communities for royalties they receive; none of these institutions has deployed these resources in development projects that could create long-term economic opportunities that compensate communities for resource destruction (FERN 2006). Today, chiefs tend to appropriate royalties for their personal or household use (Birikorang 2001). Chiefs are traditional authorities in communal natural resource management and sacred graves. Outside the permanently protected forest estates, there is now very little intact forest remaining; most of these are in sacred groves and other culturally significant areas.

The European Union (EU) Forest Law Enforcement Governance & Trade (FLEGT) and Voluntary Partnership Agreement (VPA) strategies might have the capacity to change the existing forest policy in Ghana for the better. Under this VPA initiative it is intended that Legality Assurance Schemes (LAS) will provide verification that imports of timber and timber products by European Union member nations are derived from legal forest harvesting (Blackett and Gardette 2008). This is against the background that the eradication of trade derived from illegal and uncontrolled forest exploitation is considered to be a fundamental prerequisite to achieving sustainable forest management. Ghana was accepted as a *first timber producer country* VPA strategy with the EU at the end of 2008.

However, the process that would allow for the benefits of this agreement to begin flowing seems to have come to a standstill. This is based on the fact that the development of LAS to date is still only conceptual and recommendations made on them are not yet to be considered. Funds to support the process are also a problem since further funding from the Netherlands to push the process further, requires that government of Ghana also provides some funding and demonstrate adequate commitment to the process, which has not been forthcoming. Also to enhance the

process, NGO groups require that the European Union (EU) should impose a full-scale ban on circulation of illegal timber products and not just restricted products from volunteering producer countries (FERN 2006). Another international political tool against deforestation might be trade of carbon offsets. Data suggests that an avoided deforestation initiative could be worth USD 30-346 million per year to Ghana, depending on how much deforestation it could 'avoid' and the market price for carbon offsets (Oxfam 2008).

LOCAL RESPONSIBILITY IN CURBING DEFORESTATION

Survey questions were asked from 431 local people by the Ghanaian-Finnish study group in 2005. Within the three main forest districts in Ghana (Dormaa, Offinso and Begoro) an average of 143.6 farming households were randomly selected from each of the district register of farmers provided by the Forestry Research Institute of Ghana (FORIG) and interviewed. When asked what the responsibility of local people should be in reducing deforestation, they mentioned maintaining forest through improved agroforestry farming practices (e.g. combining the production of forest tree crops and agricultural crop and animal husbandry). They also said that involving local people in bush fire management was one way to prevent forest destruction as well as empowering them to prevent and report illegal activities (Appiah *et al.* 2009). Other suggestions and all percentage responses are shown in Figure 1.

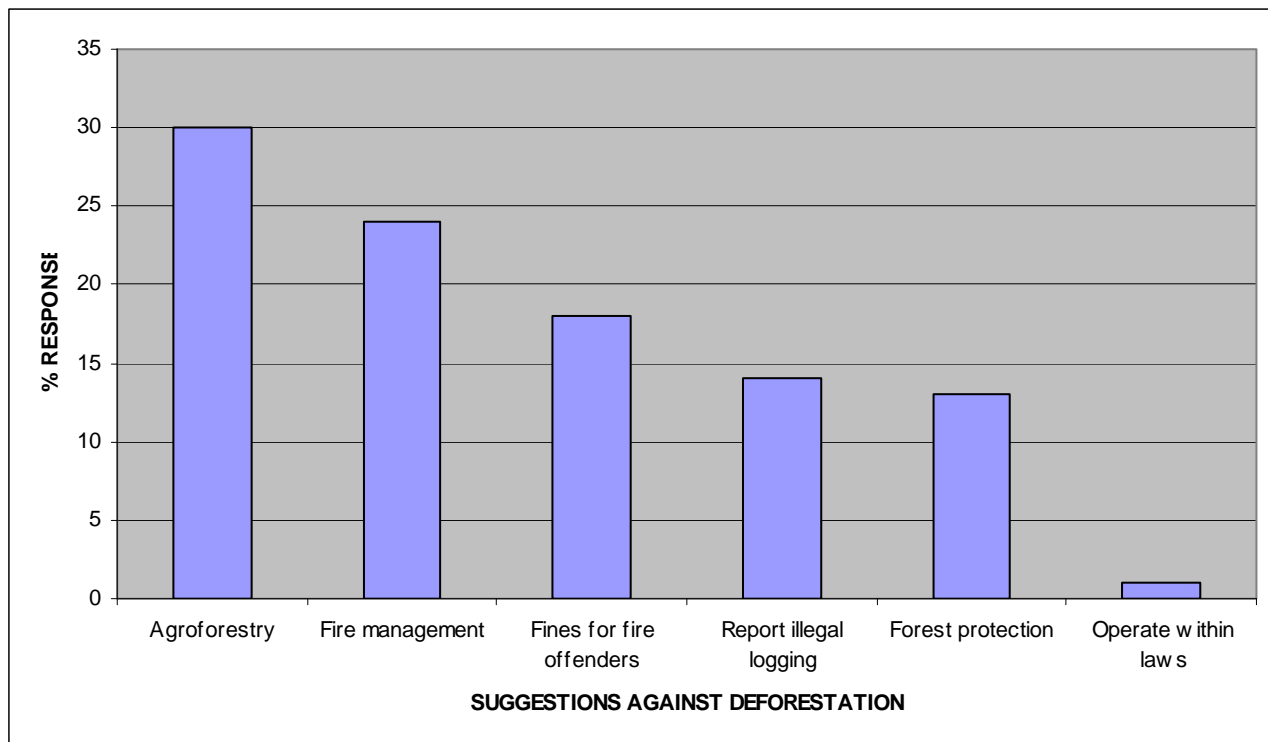


Figure 1. Suggested areas of local responsibility in curbing deforestation (n=431). Modified from Appiah *et al.* 2007.

The survey also showed that income from agriculture constituted 60% of the average total rural household income, forest income 38% and off-farm income only 2%. It clarified that the three most highly ranked causes of deforestation are poverty-driven agriculture, lack of alternative

rural wage employment other than farming and household population levels. About 77% respondents did not have off-farm jobs. All 23% who had off-farm jobs were engaged in part-time work for timber or forestry related companies. Also it showed that households with larger family sizes (average is 6.7 members) appeared to generate more income from forest (Appiah *et al.* 2009).

There is large support for the opinion for a need to secure rural income through diversification of income generation activities (e.g. Geist and Lambin 2002, Appiah *et al.* 2009). Some important alternative sources of income and food for rural people have been practised in other parts of Ghana. Successful examples come from apiculture, snail farming and fish pond establishment. However, there is a distinct lack of information about new alternatives especially among the poor local communities (Appiah 2003).

AGROFORESTRY PLANTING IN THE MODIFIED TAUNGYA SYSTEM

The Taungya system was originally developed in colonial British India in the late 1800s (Blay *et al.* 2007). It started in Ghana in the 1960s, and much of the plantation establishment was planned through this system in those reserves that had poor stocking (FAO/UNEP 1981). It was unsuccessful as a means of conversion from natural forest management to tree plantation management, as conflicts between food crop production and tree growing developed. Therefore, the Forestry Research Institute of Ghana (FORIG) started a project aiming at collaborative forest rehabilitation through the promotion of tree plantation development within and outside forest reserves.

Twelve popular indigenous and one exotic tree species were planted in a modified taungya system (MTS). Farmers were given land to grow annual agricultural crops along with forestry species during the early years of plantation establishment. The food crops were normally cultivated for three years after which crop growth is impeded by the shade from the trees. Farmers are essentially the owners of forest plantation products, with the Forestry Commission, landowners (i.e. traditional authorities) and forest-adjacent communities as partners. Annual food crops such as cocoyam, plantain and vegetables were interplanted with tree species. The project has achieved overwhelming support from the chiefs and the people (Blay *et al.* 2007).

Earlier farmers have not benefited from tree planting at all. The Ghana Timber Resource Management Amendment Act 617 of 2002 does not allow farmers to harvest timber even from their farmlands (Kalame *et al.* 2009). They are not adequately compensated for the damages caused to their crops when timber companies who have timber harvest permits are harvesting timber (Nketiah *et al.* 2005). This has motivated farmers to destroy young naturally regenerated trees on their farmlands and staying away from planting trees (Kalame *et al.* 2009).

FOUR CHALLENGES IN MAHOGANY PLANTING

In the past exotic tree species such as *Tectona grandis* and *Cedrela odorata* dominated the tree planting activities so that many of the indigenous tropical tree species were ignored and not deliberately incorporated into plantation or farming systems. As a result, there is very little or nearly no literature or solid scientific data on the indigenous tree species in Ghana so as to guide their utilisation and management in different land-use systems. Further more community forestry

activities have focused mainly on fuel wood production and little effort has been made to link the reforestation activities to restoration of the landscape as a whole.

There are many factors that can affect the utilisation and regeneration of tree species. The first challenge is that there are internal factors like intra-species genetic variation. Since germplasm collections to establish nursery lots of indigenous trees come from few trees (Lengkeek *et al.* 2004) there is the risk that biodiversity may not be utilized in appropriate manner and best suited genotypes for agroforestry may be lost. Studies have already raised concerns about the potential impact of non-randomization of progenies within nurseries on farm and landscape genetic diversity (Grogan *et al.* 2002). Secondly, the trees are also dependant on the site and environmental factors. Factors such as water deficit, nutrition, and temperature are among the most common causes of site-to site variation in tree growth and yield (Luoma-aho *et al.* 2005).

Thirdly, mahoganies rely on natural regeneration mainly through seedlings. Seed production seems not to limit the regeneration of African mahogany (*Khaya ivorensis*), but the establishment and survival of seedlings do because the seedlings are light demanding, thus seedlings that germinate in closed stands usually die within months after germination (Kukkonen 2005). The seedlings thus need large enough gaps in the forest in order to get the light and growing space needed for survival (Foli *et al.* 2003). Hence the need for silvicultural treatment, such canopy manipulation or systems like *taungya* in achieving recruitment. Fourthly, many of the indigenous species are heavily attacked by insects and diseases under culture. In the case of mahoganies, they are attacked, in particular, by the mahogany shootborer *Hypsipyla robusta* Moore in cases where there is concentration of the trees in one particular spot. This has so far made it impossible to grow mahogany species in large plantations of pure stands. Thus, forest growers are so far unable to counter balance the intensive mahogany logging in a feasible way (Kukkonen 2005).

CONCLUSION AND POLICY IMPLICATION

Against the various factors accounting for the rapid depletion of Ghana's forest resources, this paper demonstrates the benefits that accrue from restoring such degraded forest, particularly with more of indigenous timber species, under the modified *taungya* system and the challenges associated with the undertaking of such initiatives. Four challenges to be overcome and ensure mahogany species succeed in plantations have been indicated in this paper. Underlying the success of plantations in general, are the requisite efforts of fighting/curbing forest degradation, which this paper has also indicated. Key among these is the VPA processes that have been started, although they seem to have come to a standstill in Ghana. For the success of the VPA processes, NGO groups suggest the European Union (EU) to impose a full-scale ban on circulation of illegal timber products and not just restricted products from volunteering producer countries. The urgency and relevance of this call by NGO groups is underscored by the findings in the recent study of Blackett and Gardette (2008).

Generally, the implications of the results of this paper are that for communities to continue get the forest resources on which they depend, especially bushmeat, there is the need for the restoration of these degraded areas as it is already being done through the modified *taungya* system. These restoration activities need to include the indigenous tree species, especially the African mahogany species, to arrest its decline or extinction. This call is very relevant as most plantations in the country rely more on the exotic species that are believed to be fast growing, for

example teak, leaving out indigenous tree species. To support the sustainable use of the wildlife resources in forests there is need for intensive general wildlife conservation education, to remind the people of their importance and value. Also it is important to have more off-farm employment opportunities for reducing hunting pressure and dependence of bushmeat during the lean season.

In the era of declining forest resources coupled with the effort of replanting degraded forest areas in the country, a much better option of arresting this decline is to downsize the timber industry capacity to match with the resource base. This may be unpalatable to government and would therefore require its commitment to be able to implement this. Other challenges include ensuring that forest revenue is fairly distributed, particularly to ensure that communities get a share that would entice them to support these restoration processes and avoid the continuous degradation of the forest.

Hopefully the current revision in the revenue sharing arrangements where the Forestry Commission share of reserve forest royalties has been decreased 10% -will serve as the right signal and be redistributed to the greater benefit of the rural people to enhance their support in the forest management. We hope that all parties to abide by this agreement and really ensure rural people to get their fair share of the proceeds at the time of the harvesting of the trees. This shift in revenue sharing should serve to promote the complete support of communities in these restoration efforts and ensure sustainable forest management in the country.

REFERENCES

- Abeney, E.A. and Owusu, J.G.K. (ed.). 1999. Workshop for media personnel on forestry and wildlife reporting proceedings. Inst. of Renewable Nat. Resources, Ghana. 95 p.
- Alder, D. 1989. Natural forest increment, growth and yield. In: Wong, JLG (ed). Ghana Forest Inventory Project seminar proceedings 29-30 march 1989, Accra, Kumasi, Ghana, Forest Inventory Project: 47-52.
- Appiah, M., Blay, D., Damnyag, L., Dwomoh, F., Pappinen, A. and Luukkanen, O. 2009. Dependence on forest resources and tropical deforestation in Ghana. *Environment, Development and Sustainability* 11: 471-487.
- Appiah, M. 2003. Domestication of an indigenous tropical forest tree. *Silvicultural and socio-economic studies on Iroko (Milicia excelsa) in Ghana*. Doctoral thesis. University of Helsinki Tropical Forestry Reports 25. 104 p.
- BBC. 2004. Fisheries link to bushmeat trade. London: BBC. <http://news.bbc.co.uk/2/hi/science/nature/4003859.stm> Accessed 3 July 2008.
- BBC. 2006. Bushmeat boom benefits Ghana's farmers. London: BBC. <http://news.bbc.co.uk/2/hi/business/4864714.stm> Accessed 3 July 2008.
- Birikorang, G. 2001. Ghana Wood Industry and Log Export Ban Study. Study for Forestry Commission and DFID.
- Blackett, H., and Gardette, E. 2008: Cross-border flows of timber and wood products in West Africa. European Commission. Final Report, HTSPE Ltd., Hempstead.
- Blay, D., Appiah, M., Damnyag, L., Dwomoh, F., Luukkanen, O. and Pappinen, A. 2008. Involving local farmers in rehabilitation of degraded tropical forests: some lessons from Ghana. *Environment, Development and Sustainability* 10: 503-518.

- Brown, D. 2007. Is the best the enemy of the good? Livelihoods perspectives on bushmeat harvesting and trade - some issues and challenges. In: Brown, D. and Davies, G. (eds.) *Bushmeat and Livelihoods: Wildlife Management and Poverty Reduction*. Chichester: Blackwell Publishing. 111-124.
- CEPF. 2003. Chiefs join bushmeat campaign in Ghana. Arlington: Critical Ecosystem Partnership Fund. http://www.cepf.net/news/top_stories/Pages/january_topstory.aspx Accessed 3 July 2008.
- Dadebo, M. and Shinohara, T. 1999. Forest Resources and Timber Production of Ghana: Current Instruments for Sustainable Development. *J. of For. Research* 4: 1-12.
- De Merode, E., Homewood, K., and Cowlshaw, C. 2004. The Value of Bushmeat and other Wild Foods to Rural Households Living in Extreme Poverty in the Eastern Democratic Republic of Congo. *Biological Conservation* 118: 573-581.
- FAO/UNEP, 1981. Tropical forest resources assessment project, forest resources of tropical Africa. Part II: Country briefs. FAO, Rome.
- FERN, 2006. Forest Governance in Ghana. A NGOs perspective of forest governance recommendations for the VPA process in Ghana. www.fern.org
- Foli, E.G., Alder, D., Miller, H.G. and Swaine, M.D. 2003. Modelling growing space requirement for some tropical forest species. *For. Ecology and Management* 173: 79-88.
- Geist, H. and Lambin, E. 2002. Proximate causes and underlying driving forces of tropical deforestation. *Bioscience* 52(2): 143-150.
- Grogan, J., Barreto P., and Verissimo A. 2002. Mahogany in the Brazilian Amazon: Ecology and Perspectives on Management. Imazon, Belem.
- Kalame, F., Nkem, J., Idinoba, M. and Kanninen, M. Matching national forest policies and management practices for climate change adaptation in Burkina Faso and Ghana. *Mitigation and Adaptation Strategies for Global Change* 14: 135-151.
- Kukkonen, M. 2005, Conservation need of mahogany *Khaya ivorensis* in Ghana.: New insights from socio-economic and bioindicator studies. MSc thesis, Univ. of Helsinki 57p.
- Lamprecht, H 1989. Silviculture in the tropics. Tropical forest ecosystem and their tree species-possibilities and methods for their long-term utilisation. Eschborn 1989.
- Lengkeek A.G., Jaenicke, H. and Dawson, I.K. 2004. Genetic bottlenecks in agroforestry systems: results of tree nursery surveys in East Africa. *Agroforestry Systems* 63:149-155.
- Luoma-aho, T., Appiah, M., Luukkanen, O., Cobbinah, J. and Pappinen, A. 2005, Population distribution and regeneration ecology of African mahogany (*Khaya ivorensis*) in a moist tropical forest in Ghana (submitted to *Forest Ecology and Management*).
- Mayers, J. and Nii Ashie Kotey, E. 1996. Local institutions and adaptive forest management in Ghana. *Forestry and Land Use Series*, No. 7. International Institute for Environment and Development, London. 84 pp.
- Mendelson, S., Cowlshaw, G and Roweliffé, M. 2004. Anatomy of a bushmeat commodity chain in Takoradi, Ghana. *The Journal of Peasant Studies* 31: 73-100.
- Ministry of Lands and Forestry, 1996. Forestry Development Master Plan. 26 p.
- Nketiah, K., Ameyaw, J. and Owusu, B. 2005. Equity in forest benefit sharing: stakeholders' views. Tropenbos International, Ghana.

- Novick, R., Dick, W., Lemes, M., Navarro, C., Caccone, A. and Bermingjam, E. 2003. Genetic structure of Mesoamerican population of Big-leaf mahogany (*Swietenia macrophylla*) inferred from macrosatellite analysis. *Molecular Ecology*: 12, 2885-2893.
- Ntiama-Baidu, Y. West African wildlife: A resource in jeopardy. *Unasylva* No. 156.
- Owusu, J., Bonsu, D., Djokotie, E., Asamoah, A., Osiakwan, J. 2008. Special committee report on benefit sharing of revenues derived from natural forest reserves. Prepared for Ministry of Lands Forestry.
- OXFAM. 2008. Collecting wood for fuel in a village in northern Ghana. Oxford: OXFAM.
<http://www.oxfam.org.uk/coolplanet/ontheline/explore/journey/ghana.html> Accessed 3 July 2008.
- Stoorvogel, J. and Smaling, E. 1990. Assessment of soil nutrient depletion in Sub-Saharan Africa 1983-2000. SC-DLO, Wageningen.
- World Rainforest Movement 1999: Workshop on Underlying Causes of Deforestation and Forest Degradation. Background Document. Costa Rica, 18-22 January, 1999.

PUBLIC GOOD DELIVERY IN PRIVATE WOODLANDS IN ENGLAND: AN EMPIRICALLY-BASED TYPOLOGY OF SMALL-SCALE PRIVATE FOREST OWNERS

Julie Urquhart¹

Abstract--The role and nature of woodland and forest ownership is changing significantly in England. Environmental conservation and enhancement, the provision of recreation and amenity and the use of biofuels to mitigate climate change are being increasingly emphasized in new policy agendas. However, forest policy, incentives and support needs to be tailored according to the underlying values of the various types of forest owners if it is going to influence their management activities. The aim of this study was to identify different types of private woodland owners in England, especially with regard to their willingness and ability to deliver public good benefits. A postal survey was conducted and woodland owners were classified using factor analysis and cluster analysis into six owner types (n=416): the Self-interested Owner, the Multifunctional Owner, the Private Consumer, the Conservationist, the Investor and the Amenity Owner. The results confirmed the heterogeneous nature of woodland ownership and provide insight into the varying objectives and characteristics of different owner types. The findings should provide a deeper understanding of the behaviour of private woodland owners in England and provide a basis for the development of forest policy and public sector support.

INTRODUCTION

In England, woodland and forest covers 8.4% (1.1 million ha) of the land area, with over half being broadleaved woodland (FC 2001). These woodlands and forests provide an important source of public good benefits. According to a major study by Willis *et al.* (2003) the total value of the social and environmental benefits of forestry in Britain is estimated at about £1 billion per year. The aggregate capitalised value is estimated at £29.2 billion and is largely dominated by recreational and biodiversity values.

A range of policy instruments, such as incentive schemes, advisory services and regulations are used to encourage private woodland owners to provide public good benefits. Yet, according to Serbruyns and Luyssert (2006) owners are only likely to apply for subsidies that support the management activities that they would implement anyway. As suggested by Davies and Hodge (2007), “policy assumptions and instruments that are at odds with the underlying motivations of agents may actually reduce achievement of policy objectives” (p. 1). Barry and Proops (1999) agree: “until we know the ‘discourses’ people use about the environment, it will be very hard to judge what, and whether, environmental policies will be socially acceptable, and therefore capable, of being implemented” (pg. 338). Thus, it is important to understand the ownership and

¹ Countryside and Community Research Institute, University of Gloucestershire, Dunholme Villa, Park Campus, Cheltenham GL50 2PH, United Kingdom Email: jurquhart@glos.ac.uk

management motivations of these woodland owners as “knowledge of forest owners’ values, attitudes and ownership objectives is ... of crucial importance in understanding and predicting forestry behaviour in private woodlands” (Dhubhain *et al.* 2006, pg. 72).

In addition, the composition of woodland ownership has changed in recent decades. Woodland owners increasingly consist of a diverse mix of traditional or farm woodland owners, together with a wide range of new, socially-oriented owners who may have little previous experience of woodland management. With such a wide range of woodland owners, it is likely that they will have differing motivations for ownership and objectives for management. Therefore, this study attempts to shed some light on the diverse and complex range of attitudes and motivations of private woodland owners. This will inform public policy and assist in the development of programmes and incentives that will better deliver public benefits from England’s woodlands and forests.

The aim of this study was to identify owner groups based on their willingness and ability to deliver public good benefits. The findings represent the first typology of private woodland owners developed in England. The results are compared with similar typologies developed in European countries and the US to better understand what motivates woodland owners to manage their woodland in a particular way.

EXISTING CLASSIFICATIONS OF PRIVATE WOODLAND OWNERS

Most forest owner typologies have been undertaken in non-UK settings, such as mainland Europe or the United States, where forest ownership structure may differ to that in the UK. Existing typologies of private woodland owners almost exclusively classify owners into two main groups: production-oriented and consumption/protection-oriented (Dhubhain *et al.* 2006). Production-oriented owners are generally motivated by the production of wood or non-wood goods and services, usually with the objective of generating economic activity. In contrast to production-oriented owners, consumption/protection-oriented owners are motivated by amenity, nature conservation or other non-financial objectives. These objectives can be broadly divided into three classes: consumption of wood, non-wood consumption or protection and passive. A number of typologies have identified owners with non-wood consumption or protection objectives, such as nature conservation, recreation, landscape and protecting the woodland resource for future generations. Both Kuuluvainen *et al.* (1996) and Karpinnen (1998) in Finland describe owners who emphasise amenity and the recreational benefit of their woodlands as *recreationists*. These woodland owners stress the importance of the non-timber aspects of their forest ownership, including recreation, aesthetics and berry-picking. The term *recreationists* was also used in a study of American forest owners by Kline *et al.* (2000), who valued the recreational benefits of their forest as well as the importance of preserving the resource for future generations. Similarly, in an American study, Marty *et al.* (1988) describe owners who value recreation and enjoyment of their forest as *forest recreationists*.

Protection-oriented woodland owners are classified as those owners who prioritise nature conservation or other protective values in their forest. Lithuanian woodland owners who are motivated by nature conservation objectives are described as *ecologists* by Mizaraitė and Mizaras (2005). In a study in Sweden, Hugosson and Ingermarsson (2004) classify owners who emphasise the protection function of their forest as *conservationists*, while Wiersum *et al.* (2005)

use the term *environmentalists* for owners who emphasise the importance of nature and landscape.

The third type of consumption/protection-oriented owner, the passive owner, has an indifferent attitude towards their woodland. In a study in Germany, Volz and Bieling (1998) describe the *resigning owner* as perceiving their forest as having no real value, but simply creating work and worry for the owner. In a study of European forest owners, Wiersum *et al.* (2005) classified a group of owners as *indifferent*, having low levels of motivation towards their forest. In the United States, Kline *et al.* (2000) identified *passive* forest owners who had no main objectives, but felt that owning the forest was the most important aspect of their ownership.

The distinction between owner objectives is not clear-cut, however. Often, owners may have a range of objectives and motivations, so placing them into one owner type is problematic. Owners may have distinct production-oriented objectives, but they may well also value the amenity or nature conservation benefits of their woodland. Boon *et al.* (2004) describe owners in Denmark who are motivated by economic concerns as well as environmental or amenity values as *multi-objective owners*. Kuuluvainen *et al.* (1996) and Karpinnen (1998) use the same term to describe owners in Finland who value both the economic and amenity benefits from their woodland, as do Kline *et al.* (2000) in a study in the United States and Mizaraite and Mizaras (2005) in Lithuania. In a study of forest owners in Europe, Wiersum *et al.* (2005) use the term *multi-functional forest owners* to describe owners who attach equal importance to the economic benefits, nature conservation and landscape values of their forests.

Clearly, private woodland owners have a range of diverse objectives for their woodlands. Some of those objectives may well align with the aims of public policy for providing public benefits. However, there often appears to be a barrier between effective policy delivery and the private woodland owner. Thus, a better understanding of the motivations of private woodland owners is required, based not only on the owner's occupation (i.e. farmer or non-farmer) or their proximity to the woodlands, but, crucially, on their objectives for woodland ownership and management (e.g. nature conservation, personal enjoyment).

METHODOLOGY

This paper is based on a study in three areas in England: the Lake District, Cornwall and the High Weald Area of Outstanding Natural Beauty (AONB). A sample frame in each study area was compiled from a range of sources, including the Forestry Commission's Woodland Grant Scheme and felling licence applicant database, Cumbria Woodlands, the High Weald AONB, the Small Woodland Owners' Group and a number of personal contacts. While every endeavour was made to ensure the sample frame was as comprehensive as possible there was inevitably some coverage error. Not every individual private woodland owner in each study area could necessarily be identified. Gaining access to lists of owners is problematic, due to concerns over confidentiality. Furthermore, disengaged woodland owners are difficult to identify due to the fact that they have no affiliation with any agency or body. However, in order to include a proportion of disengaged woodland owners, a number of owners were contacted through snowballing.

Data collection

A random sample of private woodland owners was selected in each of the study areas, with data collection taking place in May and June 2008. In order to maximize response rates and to reduce

survey error, Dillman's Tailored Design Method (TDM) (Dillman 2007) was adopted. As recommended by Dillman (2007) the postal survey involved a sequence of five contacts: brief pre-notice letter; questionnaire and cover letter with a token incentive; thank you postcard; replacement questionnaire 2-4 weeks later and a final contact by telephone or special delivery mail 1 week later. Reply envelopes were enclosed to make it easier for the respondent to return the questionnaire (Armstrong & Luske 1987). A small token of appreciation in the form of two first class stamps was also enclosed to instil trust. The inclusion of token incentives, especially monetary ones, has been shown to consistently improve response rates (James & Bolstein 1990, James & Bolstein 1992, Church 1993).

The questionnaire was prepared on the basis of a pilot study involving interviews with woodland owners and a review of the literature on other similar studies. The questionnaire comprised 26 questions with 5-point Likert scales concerning:

- The woodland (size, type (broadleaf/conifer))
- The woodland owner (gender, age, employment status, membership or organisations, how long owned woodland, how woodland acquired, type of ownership, distance from woodland, sources of management information and advice, use of subsidy schemes)
- Objectives for ownership (privacy, conservation, recreation, economic)
- Perception of the importance of public good benefits (financial return, recreation, shooting, biodiversity, climate)
- Management activities (coppicing, thinning etc., wood products)
- Constraints on woodland management (time, money, skills)

Data

The postal survey was distributed to 600 woodland owners in the study areas. The total response rate for the survey was 81% (488 replies), 71% (426 surveys) of which were useable surveys. A comparison between early and late respondents was carried out to identify whether there was any significant difference between those who responded early and those who responded late (Desselle 2002). The analysis was conducted by comparing demographic variables and a number of motivational variables between the first 50 respondents and the last 50 respondents. The results suggested no significant difference between early and late respondents. The high response rate is ascribed to the successful application of multiple mailings, increasing the overall response rate of useable surveys from 31% (after mailing 2) to 71%.

Analysis of data

The development of the woodland owner typology was carried out by a three-step process, adapting the methodology developed by McLeay *et al.* (1996), Davies (2001) and Tsourgiannis (2007) in their studies of farmer marketing behaviour. Factor analysis was conducted in the initial stage of the analysis in order to reduce the number of variables to those that provided the best explanation for the range of perceptions and the motivations of owners (Tabachnick & Fidell 2001, Hair *et al.* 2006). The second phase of analysis involved subjecting the factor scores to hierarchic and non-hierarchic cluster analysis in order to classify private woodland owners with similar objectives and behavioural patterns into distinct groups (Lorr 1983, Tacq 1997,

Tabachnick & Fidell 2001, Hair *et al.* 2006). Finally, the validity of the independent variables from the factor analysis to predict cluster membership was assessed using a discriminant analysis (Klecka 1980, Tabachnick & Fidell 2001, Hair *et al.* 2006, Warner 2008).

RESULTS

Descriptive statistics of the sample

Ancient semi-natural woodlands accounted for a third of the woodland in the study, with a further third being mixed woodland. The remaining third was mostly broadleaves, with a small proportion (0.8%) of purely conifer woodland or other woodland type (1.8%). Over half of the woodland in the High Weald was ancient semi-natural woodland (ASNW), whereas the Lake District had the largest proportion of mixed woodland and Cornwall was dominated by broadleaves.

Over half (59.2%) of the woodland owners in this study had woodlands of 10 hectares or smaller and 14.5% of owners had woodlands over 50 hectares. Of the case study areas, of particular note is that the High Weald had a smaller proportion (12.9%) of very small woodlands (<2 ha) than either the Lake District (23.0%) or Cornwall (24.4%). The very large woodlands (>50 ha) were more likely to be located in either the High Weald or the Lake District.

Of the participants, 37.2% stated that they were individual non-farm woodland owners, with a further 31.6% stating they were farmers. 13.7% of the woodlands were on estates², and 11.9% were owned collectively by families. A small proportion of the woodlands were owned by trusts (2.0%), charities (2.3%) or other bodies (1.3%). It is evident from the data that the High Weald contained the highest proportion of individual non-farm woodland owners (47.5%), followed by the Lake District (33.6%). Cornwall was dominated by farm owners (40.6%) and the Lake District had the highest proportion of estates (21.1%).

Most of the woodlands in this study had been owned for 10 years or less (47.7%), with 27.2% of the woodlands owned for less than 5 years. Only 14.6% of the participants had owned woodland for more than 31 years. When compared to the owner type, there was a significant difference between owner type and length of ownership ($\chi^2 = 56.728$; $p < .0001$), with estate woodlands being in same ownership for longer than individual-owned woodlands.

The demographic statistics for this study showed that 83% of the sample respondents were male. There was no significant difference in gender of respondents between the study areas ($\chi^2 = 0.614$; $p = .736$). Just 0.3% of the sample population was under 30 years old, with 73.3% of the sample over 50 years old. Of the sample, 40.3% indicated that they were self-employed. A large proportion (27.8%) were retired, and a further 23.0% were in full-time employment.

Typology of woodland owners

Eight distinct factors were identified in the factor analysis, explaining 62.8% of the total variance. Factor loadings are in effect coefficients, with high loadings being significant. Factor scores of .450 and above were considered significant (based on McKeown and Thomas' (1988)

² In the UK an estate comprises the houses, outbuildings, farmland and woods that surround the gardens and grounds of a very large property, such as a country house or mansion. It is an "estate" because the profits from its produce and rents support the household in the house at its centre.

recommendation that loadings in excess of 2.5 times the standard error are significant). The factors, along with their defining variables, are shown in Table 1.

Table 1: Results of Principal Components Analysis of Variables

Var	Underlying Strategic Variables	Factor loading
Factor 1: Financially-oriented		
v3	Reason for ownership: For financial investment	.720
v9	Reason for ownership: To produce timber products	.639
v16	Need for financial return	.772
v18	Importance of timber prices	.808
v22	Importance of grant availability	.471
v26	Maintaining quality of timber	.619
Factor 2: Conservation		
v2	Reason for ownership: To enhance wildlife	.718
v7	Reason for ownership: To mitigate climate change	.514
v21	Importance of restoring broadleaves	.735
v27	Enhancement of wildlife habitats	.651
Factor 3: Private consumption		
v9	Reason for ownership: To produce timber	.504
v11	Reason for ownership: To produce firewood or biofuel	.809
v17	Importance of wood for own use	.744
v49	Benefits: Woodfuel	.709
Factor 4: Public amenity		
v13	Reason for ownership: For public recreation/enjoyment	.809
v15	Reason for ownership: For education	.633
v20	Importance of recreational opportunities	.677
v44	Benefits of woodland: Public recreation	.774
Factor 5: Personal enjoyment		
v1	Reason for ownership: To enjoy scenery	.706
v5	Reason for ownership: For privacy	.724
v6	Reason for ownership: For personal enjoyment	.713
v23	Importance of improving scenery	.514
v46	Benefits: Property value	.461
Factor 6: Environmental		
v7	Reason for ownership: To mitigate climate change	.557
v47	Benefits: Pollution control	.836
v50	Benefits: Carbon storage	.789
Factor 7: Constrained		
v28	Constraints: Lack of money	.706

v29	Constraints: Lack of time	.813
v31	Constraints: Lack of skills	.544
v39	I would manage my woodland better if it was financially advantageous	.651
<hr/>		
	Factor 8: Grant dependent	
v22	Importance of grant availability	.494
v42	Funding: grants	.793
v43	Don't want to be told what to do	-.767*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.792, $p < 0.01$

Bartlett test of sphericity = 4628.502, $p < 0.0001$

*Negative loading indicates that participants disagreed with this variable.

The factor scores (mean = 0; standard deviation = 1) were subjected to a subsequent cluster analysis, using both hierarchical and non-hierarchical clustering techniques, as recommended by Hair *et al.* (2006) and Milligan (1980). The six extracted clusters were named according to the objectives, motivations and attitudes that each cluster represented. Mean factor scores for owners in each discrete group and the results of the ANOVA tests are shown in Table 2. High mean scores indicate that a particular factor is important to that cluster or owner type.

The data in Table 2 indicate that Self-interested Owners represent the largest number of respondents in the sample (96 participants, 24%), with Investors representing the smallest number of respondents (38 participants, 9.5%). However, when the owner types are compared to the area of woodland owned, Multifunctional Owners represent ownership of the largest area of woodland in the sample (37%) and Conservationists the smallest (3%) (see Figure 1).

The stepwise discriminant analysis confirmed the predictive ability of the identified strategic variables (from the factor analysis) to predict cluster membership with 93% of cases in the holdout sample correctly classified. A summary of each of the owner groups identified follows, drawing on the demographic and profiling characteristics alongside the multivariate results.

Self-interested Owner. Self-interested Owners primarily valued the privacy and personal enjoyment they get out of their woodland. They appreciate the landscape values of their woodland and are keen to protect it from future development. Owners are most likely to be men between 50-69 years old who are either self-employed or retired. Of all the owner groups, Self-interested Owners are the least likely to apply for a grant to assist in their woodland management. Although Self-interested Owners are likely to be found in each of the study areas, almost 40% were located in the High Weald AONB. They typically own fairly small woods of between 3-10 hectares, consisting of mixed, ASNW or broadleaf woodlands. About 25% have owned their woodland for less than 5 years and over 75% have owned their woodland for less than 20 years. Most are likely to have bought their woodland and live adjacent to it. Almost 47% of owners in this group are individuals, but a further 30% are farmers. Self-interested owners are most likely to use a woodman to carry out the management activities in their woodland. They are not motivated by financial return and do not encourage recreational access in their woods. While Self-interested Owners represent the highest proportion of woodland owners in the sample, in terms of woodland area they only represent 8% of the woodland area.

Table 2: Characteristics of Six Woodland Owner Types Derived from Cluster Analysis

Factors	Owner Groups							Sig.
	I	SiO	PC	AmO	MfO	C	F	
X1: Financially-oriented	0.758	-0.253	-0.373	-0.521	1.093	-0.491	59.552	<.0001
X2: Conservation	-0.825	-0.491	0.282	0.541	0.140	0.599	27.157	<.0001
X3: Private consumption	-0.184	-0.13	0.716	-0.461	0.389	-0.827	28.830	<.0001
X4: Public Amenity	-0.483	-0.134	-0.361	1.561	0.459	-0.882	81.528	<.0001
X5: Personal enjoyment	-1.353	0.494	0.340	-0.723	0.345	0.011	48.746	<.0001
X6: Environmental	-0.327	-0.187	-0.463	-0.07	0.544	0.625	19.805	<.0001
X7: Constrained	-0.060	0.582	-0.809	-0.089	0.008	0.218	22.332	<.0001
X8: Grant dependent	-0.098	-0.736	0.323	0.251	0.059	0.448	18.577	<.0001
Numbers of cases (n=399)	38	96	78	50	79	58		

I = Investor; SiO = Self-interested Owner; PC = Private Consumer; AmO = Amenity Owner; MfO = Multifunctional Owner; C = Conservationist

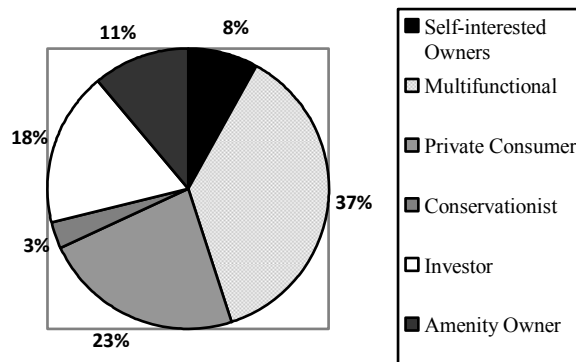


Figure 1: Total area of sample woodland by owner group

Multifunctional Owner. Multifunctional Owners have multiple objectives for managing and owning woodland. They are concerned about investment and financial considerations, but they combine extracting wood products with recreation, environmental aspects and their own personal enjoyment. Owners are most likely to be men between 50-59 years old who are self-employed. Although Multifunctional Owners are not constrained by money and do not rely on grants to assist with woodland management, of all the owner groups they are the most likely to apply for a grant (with 93.7% stating that they had applied for a grant). Although Multifunctional Owners are likely to be found in each of the study areas, almost 40% were located in the High Weald AONB and just over 35% in Cornwall. Multifunctional Owners may own woodlands of varying

sizes, but they are most likely to have either fairly small woods (3-10 hectares) or very large woods (over 51 hectares). Their woodlands are most likely to be mixed and have either been bought or planted and they are likely to live adjacent to the woods. Almost 30% of the owners have owned their woodlands for less than 5 years, but just over 22% been in ownership for over 31 years. Just over a third of Multifunctional Owners are likely to be farmers, but almost 25% are individuals, and just over 21% are estate owners. It is likely that the larger woods in this owner group are those on estates. Multifunctional Owners are most likely to use a contractor to carry out the management work. In terms of woodland area, the Multifunctional Owner is the largest of the owner groups, accounting for 37% of the woodland area in the study.

Private Consumer. Private Consumers valued their woodland primarily for the wood products they can harvest (such as wood logs, poles etc.) for their own domestic use. However, they also appreciate the wildlife benefits and their own personal enjoyment of the woodland. Owners are most likely to be between 60-69 years old who are either retired or self-employed. Of all the owner groups, the Private Consumer is the most dominated by men, with only 6.4% owners in this group being women. Although 83.3% of owners in this group stated they had applied for a grant, this is second least likely group to do so. They do consider grants useful in assisting their management activities, but as this owner group is not financially-oriented, nor are they constrained by a lack of time or money, they are less likely to apply for a grant than other, more grant-dependent, owner groups. Private Consumers are found in all study areas, but 47.4% are located in the High Weald, the largest owner group in this case study area. Their woodlands are generally small (3-10ha) or very small (less than 2ha) and likely to be ASNW. Almost 65% have owned their woodland for less than 15 years, but 36% of these have been owned for less than 5 years. The majority of Private Consumers are individual owners who live adjacent to their woodland and they are likely to carry out the management work themselves. Private Consumers are not motivated by financial return and, since they value their own privacy, they are not keen on opening up their woodland for public access. In terms of woodland area, the Private Consumer is the second largest of the owner groups, accounting for 23% of the sample woodland area.

Investor. Investors are the most financially-oriented of all the owner groups and prioritise timber production and investment opportunities in their woodland over any other objectives. Owners are likely to be men between 50-59 years old who are self-employed. The Investors are the second most likely owner group to apply for a grant to assist in their management of their woodlands. The majority of this owner group (almost 60%) is likely to be found in the Lake District. They either own small woodlands (3-10 ha) or very large woodlands (over 51 ha) which are either mixed or broadleaves. Just over 20% have owned their woodlands for 6-10 years and a further 20% have owned their woodlands for over 31 years. Investors have either bought or inherited their woodland and they either live adjacent to it or a short distance (between 2-10 miles) away. Investors are likely to be individual owners or farmers who use a contractor to carry out the management activities. They are not motivated to manage their woodland for their own personal enjoyment, nor for the public benefits of wildlife conservation or recreation. In terms of woodland area, the Investor is the third largest of the owner groups, accounting for 18% of the sample woodland area.

Amenity Owner. Amenity Owners are the keenest of all the owner groups to open up their woodlands to public access in the form of informal recreation. This owner group has the highest

proportion of women (28.6%) and owners are likely to be between 50-59 years old who are self-employed. Amenity Owners are very likely to apply for a grant to assist with their management activities. They are likely to be found equally in each of the study areas. Amenity Owners either own small woodland (3-10ha) or very large woodlands (over 51ha) which are either mixed, ASNW or broadleaf. While 40% have owned their woodlands for between 6-10 years, a further 20% have owned their woodlands for over 31 years. Amenity Owners are likely to be farmers, but they also constitute the largest proportion of charity, trust or club ownership. Much amenity woodland has been planted and while most owners live adjacent to their woodlands, they have the largest proportion (14%) of owners who are absent (over 40 miles). While owners do a lot the work in their wood themselves, they also rely on other family members to assist with the management tasks. This group of owners is not financially-oriented nor do they not own their woodland for their own personal enjoyment or consumption. In terms of woodland area, the Amenity Owner group accounts for 11% of the sample woodland area.

Conservationist. The Conservationists are primarily motivated to manage their woodlands to conserve wildlife habitats. They also appreciate the broader environmental objectives, such as pollution control or climate change. This owner group has a high proportion of women (26.3%) and owners are likely to be between 60-69 years old who are either retired or self-employed. Conservationists are likely to apply for a grant to assist with the management of their woodland. Almost 60% of this owner group is likely to be located in Cornwall, with almost 50% owning their woodland for less than 5 years. Conservationists generally own small woodlands of less than 10 hectares or very small woodlands of less than 2 hectares. Generally their woodlands are either ASNW or broadleaf. While some of the woodland was bought or inherited, the Conservationist Owners have the largest proportion of planted woodland of all the owner groups (65%). Owners are either farmers or individual owners who live adjacent to their woodland. They will generally use a contractor to carry out the management work. This owner group is not financially-motivated and they are opposed to recreational access to their woodlands. In terms of woodland area, the Conservationists account for the smallest proportion of owners, with only 3% of the sample woodland area.

DISCUSSION

The results of this study confirm that woodland ownership in England is diverse, with owners having a range of attitudes towards the delivery of public good benefits in their woodland. Six discrete owner types were identified reflecting differing approaches to woodland management, with certain owner types more predisposed towards public good delivery than others.

Results of the bivariate analysis indicate that almost half of the survey participants were 'new' woodland owners (i.e. who have owned woodland for less than 10 years). These findings are consistent with previous literature regarding the increase in ownership of woodland by those with no previous rural land management experience (Harrison *et al.* 2002; Kvarda 2004). Also Boon and Meilby (2004), Lidestav (1998) and Ripatti and Jarvelainen (1997) suggest female woodland ownership is increasing. 16.3% of the present study's sample population were women and were most likely to be either Conservationists or Amenity Owners, the owner types with the highest proportion of new owners. Some studies suggest attitude differences between gender (Lidestav 1998; Lidestav & Ekstrom 2000). While not statistically significant, this study did find

female owners were most likely to have protection or conservation values. Production values were most likely to be held by men.

The implications of this study are highly relevant to policies that seek to maximize public good benefits in private woodlands. Clearly, a range of policy options will be required to meet the varying demands of the English forest estate, including advisory services, incentives and market mechanisms. Of all owner types, Multifunctional Owners are the most likely to deliver a range of public benefits, while Self-interested Owners are unlikely to explicitly provide any public goods (some public good values will automatically be provided, such as landscape values or air quality control, without any input from the owner). Each of the identified owner types will accept or reject various policy instruments dependent on their motivations and objectives. The following discussion identifies types of woodland owner that are likely to be influenced by different policy measures. It also addresses how those measures can be tailored to be more effective at meeting both the needs of the woodland owner and policy objectives.

Incentives schemes. Direct government intervention occurs mainly through the provision of grants. The Forestry Commission currently offers a suite of grants under the English Woodland Grant Scheme. These grants provide funds for woodland planning, assessment, regeneration, improvement, management and creation. The findings of this study suggest that grants are the most attractive to Multifunctional Owners, Amenity Owners, Conservationists and Investors. Private Consumers and Self-interested Owners are the least interested in grants, reflecting their strong sense of perceived property rights and privacy. These owners may feel that by accepting a grant they will lose some control over the management of their woodland. They do not wish to be told what to do and may mistrust the motives of grant providers. Many private woodland owners often feel very attached to their woodland and, according to Sime *et al.* (1993): “maintaining rights of ownership and control are more important than the offer of a grant in influencing the attitude of woodland owners” (p. ii).

Woodland grants schemes need to be flexible and reflect the motivations of the woodland owners they are targeting. While production-oriented owners, such as Investors, may be influenced by policy makers to manage their woodland in a certain way if it is shown to provide financial return, the consumption or protection-focused woodland owner, such as the Conservationists and Amenity Owners, may be influenced by management approaches which emphasise nature conservation or amenity, as opposed to financial gain. The Investors in this study account for only 18% of the sample population, suggesting that incentives that focus purely on financial gain are unlikely to attract the majority of woodland owners. However, 92% of woodland owners in this study have clearly defined non-market objectives, such as wildlife conservation and amenity, which are broadly in line with current forest policy objectives, which highlight the provision of environmental and social benefits in woodlands.

Market mechanisms. In an economic analysis of forestry policy in England, CJC Consulting (2003) asserted that any government intervention for timber must demonstrate a high return of public good delivery. Indeed, England’s forest strategy (Defra 2007) aims to “improve the competitiveness of woodland businesses and promote the development of new or improved markets for sustainable woodland products and ecosystem services *where this will deliver identifiable public benefits*, nationally or locally, including the reduction of carbon emissions” (emphasis added). Many woodland owners in this study expressed their desire to manage their woodlands better, especially if there was a market for their wood products. This concurs with

Church *et al.* (2005) who showed that private woodland owners are more interested in improving general woodland management in their woodland through appropriate incentives than increasing public access (80% already had public rights of way).

The findings of the present study suggest that, for some owner types, such as Investors and Private Consumers, perhaps stimulating the market for timber or other wood products may provide a more appropriate form of government intervention than subsidies. Research undertaken by Slee *et al.* (2006) for the Forestry Commission concluded that moderate levels of woodland management for timber or wood products can have a beneficial impact on public good benefits, especially biodiversity and recreation. Three of the woodland owners types (Multifunctional, Private Consumers and Investors), accounting for 78% of the sample population, are likely to be influenced to manage their woodlands via market mechanisms. For these owners, if there was a viable market for their wood products (timber or wood fuel), they would be more likely to actively manage their woodland. With the growth in energy requirements from wood fuel and the government's commitment to increasing the renewable energy sector, this presents a potentially growing market for low-grade timber from England's woodlands.

Multifunctional Owners are also keen to diversify their activities in their woodland. There are opportunities for the development of commercial recreational sites, such as visitor centres, eco-tourism and mountain bike trails. Such enterprises are often the domain of public-owned forests, such as Bedgebury Pinetum and Coed-y-Brenin. Public sector support in joint projects between state and private owners to invent new opportunities or improve the scope of existing ones may encourage certain types of woodland owner, such as Multifunctional Owners or Investors. Certification, especially through partnerships between owners, may provide a practical way to provide both public good benefits and economic profitability. The high cost of certification is often a barrier to small woodland owners, so a partnership approach may provide a cost-effective strategy to starting up in business.

Advisory services. All owner groups in this study indicated that some form of advisory service was important to them to one degree or another. Information and advice is especially important to new woodland owners (almost half of the survey sample had owned their woodland for less than 10 years). The most cited source of information for woodland owners in the survey was time spent in the woodland and personal experience. After personal experience, the woodland owners in this study most frequently sought advice from reading books about managing woodland or through Forestry Commission officers and publications. This presents an excellent opportunity for the Forestry Commission to develop an advisory programme to provide education and advice to woodland owners. Practical advice on woodland management, information about the wider public good benefits provided by woodland is also needed. As well as increasing access to information through publications, the Forestry Commission has a powerful advisory tool in its woodland officers, who visit and advise private woodland owners. Many owners in this study indicated that they found the help and advice they had received from a Forestry Commission officer very useful. However, some commented that getting hold of a Forestry Commission officer was difficult and they always seemed to be very busy and overstretched. Woodland advisory officers might benefit greatly from engagement with best practice extension services in other rural land use sectors, such as agriculture. In order to enhance the delivery of public benefits from private woodlands it is likely that government

investment in advisory services will be required to enhance the support and training of woodland officers.

Most owners also indicated that they would seek advice from other woodland owners and visit other woodlands. This suggests that owners are keen on sharing best practice. The development of forums and cooperatives for woodland owners to share experiences, such as the Woodland Initiatives Network (funded by the Forestry Commission and the Countryside Agency, and hosted by the Small Woods Association), can provide support to woodland owners and link up wood producers with consumers. Good practice and successful woodland management could be shared in the form of demonstration projects. Forest Enterprise may be able to facilitate this, providing advice and sharing their experiences with private woodland owners.

In conclusion, the study represents a useful and robust typology of private woodland owners in England. A valid and reliable methodology has been developed which could be used to replicate further study areas across the UK and beyond. The classification of owners presents a useful tool for informing public policy on the provision of public good benefits in private woodlands in England.

ACKNOWLEDGEMENTS

The financial support of the Economic and Social Research Council and the Forestry Commission is gratefully acknowledged for this research. The views expressed in this paper are those of the author and not attributable to the funding bodies in any way. The Forestry Commission, Cumbria Woodlands, the High Weald AONB and the Small Woodland Owners' Group are also acknowledged for providing access to woodland owner databases for this study.

REFERENCES

- Armstrong, J.S. & Luske, E.J. (1987). "Return postage in mail surveys: A meta-analysis." *Public Opinion Quarterly*, 51: 233-248.
- Barry, J. & Proops, J. (1999). "Seeking sustainability discourses with Q methodology." *Ecological Economics*, 28: 337-345.
- Boon, T.E. & Meilby, H. (2004). *Relations between owner characteristics and forest ownership objectives*. Human Dimensions of Family, Farm and Community Forestry International Symposium, 29 March-1 April 2004, Washington State University, Pullman, WA, USA.
- Boon, T. E., Meilby, H. & Thorsen, B.J. (2004). "An Empirically Based Typology of Private Forest Owners in Denmark: Improving Communication Between Authorities and Owners." *Scandinavian Journal of Forest Research*, Suppl. 4: 45-55.
- Church, A., Ravenscroft, N. & Rogers, G. (2005). *Woodland Owners' Attitudes to Public Access Provision in South-East England*. Information note on report to the Forestry Commission, Edinburgh.
- Church, A. H. (1993). "Estimating the effect of incentives on mail survey response rates: A meta-analysis." *Public Opinion Quarterly*, 57: 62-79.
- CJC Consulting (2003). *Economic Analysis of Forestry Policy in England*, report to Defra and H.M. Treasury.
- Davies, B. B. & Hodge, I.D. (2007). "Exploring environmental perspectives in lowland agriculture: A Q methodology study in East Anglia, UK." *Ecological Economics*, 61(2-3): 323-333.

- Davies, D. (2001). *An investigation into the factors determining ruminant livestock distribution in the far south west*, University of Plymouth. Unpublished PhD Thesis.
- Defra (2007). *A Strategy for England's Trees, Woods and Forests*.
- Desselle, S. P. (2002). "Implementing Mail Survey Questionnaires." *Journal of Managed Care Pharmacy*, 8(2): 157-161.
- Dhubhain, A. N., Chobanova, R., Karpinnne, H., Mizaraite, D., Ritter, E., Slee, B. & Wall, S. (2006). The values and objectives of private forest owners and their influence on forestry behaviour: the implications for entrepreneurship. *Issues affecting enterprise development in the forest sector in Europe, Research Notes 169*. (Ed.) Niskanen, A., University of Joensuu, Faculty of Forestry: 71-83.
- Dillman, D. A. (2007). *Mail and Internet Surveys: The Tailored Design Method*. New Jersey, John Wiley & Sons.
- FC (2001). *National inventory of woodland and trees - England*. Forestry Commission, Edinburgh.
- Hair, J. F., Black, W.C., Babin, B.J., Anderson, R.E. & Tatham, R.L. (2006). *Multivariate Data Analysis*. New Jersey, Pearson Education Inc.
- Harrison, S., Herbohn, J. & Niskanen, A. (2002). "Non-industrial, Smallholder, Small-scale and Family Forestry: What's in a name?" *Small-scale Forest Economics, Management and Policy*, 1(1): 1-11.
- Hugosson, M. & Ingermarson, F. (2004). "Objectives and motivations of small-scale forest owners; modelling and qualitative assessment." *Silva Fennica*, 38(2): 217-231.
- James, J. M. & Bolstein, R. (1990). "The effect of monetary incentives and follow-up mailings on the response rate and response quality in mail surveys." *Public Opinion Quarterly*, 54: 346-361.
- James, J. M. & Bolstein, R. (1992). "Large monetary incentives and their effect on mail survey response rates." *Public Opinion Quarterly*, 56: 442-453.
- Karpinnen, H. (1998). "Values and objectives of non-industrial private forest owners in Finland." *Silva Fennica*, 32(1): 43-59.
- Klecka, W. R. (1980). *Discriminant Analysis*. Newbury Park, Ca., Sage Publications Inc.
- Kline, J. D., Alig, R.J. & Johnson, L. (2000). "Fostering the production of non-timber services among forest owners with heterogeneous objectives." *Forest Science*, 46(2): 302-311.
- Kuuluvainen, J., Karpinnen, H. & Ovaskainen, V. (1996). "Landowner Objectives and Nonindustrial Private Timber Supply." *Forest Science*, 42(3): 300-309.
- Kvarda, E. (2004). "'Non-agricultural forest owners' in Austria - a new type of forest ownership." *Forest Policy and Economics*, 6(5): 459-467.
- Lidestav, G. (1998). "Women as non-industrial private forest landowners in Sweden." *Scandinavian Journal of Forest Research*, 13: 66-73.
- Lidestav, G. & Ekstrom, M. (2000). "Introducing gender in studies on management behaviour among non-industrial private forest owners." *Scandinavian Journal of Forest Research*, 15: 378-386.
- Lorr, M. (1983). *Cluster Analysis for Social Scientists*. San Francisco, CA., Jossey-Bass Inc. Publishers.
- Marty, T. D., Kurtz, W.B. & Gramann, J.H. (1988). "PNIF owner attitudes in the Midwest: A case study in Missouri and Wisconsin." *Northern Journal of Applied Forestry*, 5(3): 194-197.

- McLeay, F., Martin, S. & Zwart, T. (1996). "Farm business marketing behaviour and strategic groups in agriculture." *Agribusiness*, 12: 339-351.
- Milligan, G. (1980). "An Examination of the Effect of Six Types of Error Perturbation on Fifteen Clustering Algorithms." *Psychometrika*, 45(September): 325-342.
- Mizaraitė, D. & Mizaras, S. (2005). "The formation of small-scale forestry in countries with economy in transition: observations from Lithuania." *Small-scale Forest Economics, Management and Policy*, 4(4): 437-450.
- Ripatti, P. & Jarvelainen, V.P. (1997). "Forecasting structural change in non-industrial private forest ownership in Finland." *Scandinavian Forest Economics*, 36: 215-230.
- Serbruyns, I. & Luyssaert, S. (2006). "Acceptance of *sticks, carrots and sermons* as policy instruments for directing private forest management." *Forest Policy and Economics*, 9: 285-296.
- Sime, J. D., Speller, G.M. & Dibben, C. (1993). *Research into the attitudes of owners and managers to people visiting woodlands*, Report prepared for the Forestry Commission by Jonathan Sime Associates, Godalming.
- Slee, B., Urquhart, J. & Taylor, D. (2006). *Woodland Management for Timber and Wood Products: The Impact on Public Goods*, Countryside and Community Research Unit, University of Gloucestershire, report prepared for the Forestry Commission and Defra.
- Tabachnick, B. G. & Fidell, L.S. (2001). *Using Multivariate Statistics*. Boston, MA, USA, Pearson Education Inc.
- Tacq, J. (1997). *Multivariate Analysis Techniques in Social Science Research*. London, Sage Publications Ltd.
- Tsourgiannis, L. (2007). *The marketing strategies of livestock enterprises in Objective One Regions: A comparative study between Greece and United Kingdom*, University of Plymouth. Unpublished PhD Thesis.
- Volz, R. & Bieling, C. (1998). "Zur Soziologie des Kleinprivatwaldes." *Forst & Holz*, 3: 67-71.
- Warner, R. M. (2008). *Applied Statistics*. Thousand Oaks, Ca., Sage Publications Inc.
- Wiersum, K. F., Elands, B.H.M., Hoogstra, M.A. (2005). "Small-scale forest ownership across Europe: characteristics and future potential." *Small-scale Forest Economics, Management and Policy*, 4(1): 1-19.
- Willis, K.G., Garrod, G., Scarpa, R., Powe, N., Lovett, A., Bateman, I.J., Hanley, N. & Macmillan, D.C. (2003). *The Social and Environmental Benefits of Forests in Great Britain*. Edinburgh, report to the Forestry Commission.

THE EFFECTS OF WILDFIRE AND ENVIRONMENTAL AMENITIES ON PROPERTY VALUES IN NORTHWEST MONTANA, USA.

Tyron J. Venn¹, Kyle M. Stetler¹ and David E. Calkin²

Abstract--This study employed the hedonic price framework to examine the effects of 256 wildfires and environmental amenities on home values in northwest Montana between June 1996 and January 2007. The study revealed environmental amenities, including proximity to lakes, national forests, Glacier National Park and golf courses, have large positive effects on property values in northwest Montana. However, proximity to and view of wildfire burned areas has had large and persistent negative effects on home values. The analysis supports an argument that homebuyers may correlate proximity to and view of a wildfire burned area with increased wildfire risk. Indeed, when a burned area is not visible from a home, wildfire risk appears to be out of sight and out of mind for homebuyers. Findings from this research can be used to support more efficient allocation of resources to wildfire preparedness (e.g. public education and fuel treatments) and suppression activities around the wildland-urban interface.

INTRODUCTION

The United States, Canada and Australia, have growing wildland-urban interface (WUI) communities, with new residents attracted to environmental amenities, including aesthetics, wildlife, forests, lakes, streams and recreational access to public land (Beringer 2000, Rasker and Hansen 2000, Frentz *et al.* 2004, Hunter *et al.* 2005, McGee 2007). As a result, human life and property is increasingly threatened by wildland fire in these nations, and government land management agencies and fire departments are increasingly faced with the challenge of their protection (McCaffrey 2004, Handmer and Tibbits 2005, McCool *et al.* 2006, Hammer *et al.* 2007, McGee 2007). Tragedies, like the Victorian bushfires of 2009 (Stewart *et al.* 2009), are likely to be repeated.

Presently, the management of wildfire and the WUI is one of the most complex and politically charged natural resource management challenges in the United States. The United States Department of Agriculture Forest Service (Forest Service) has spent more than US\$1 billion managing wildfires during six of the past nine wildfire seasons to 2008 (unpublished data compiled and maintained by the Forest Service Rocky Mountain Research Station). Several factors are believed to have contributed to the high level of suppression expenditures, including: fuel accumulation due to past successful fire suppression activities; a more complex fire fighting environment due to increased private development in the WUI; climate change; limited economic accountability among fire managers; and a fire management incentive system that makes fire managers more risk averse than may be socially optimal (National Academy of Public Administration 2002; USDA Forest Service *et al.* 2003; Calkin *et al.* 2005; Maguire and Albright

¹ College of Forestry and Conservation, The University of Montana, Missoula, MT 59812, USA.

² Rocky Mountain Research Station, USDA Forest Service, Missoula, MT 59801, USA.

2005; Running 2006; Westerling *et al.* 2006, Liang *et al.* 2008). The United States Federal Government is concerned that fire suppression resources are not being employed in an economically efficient manner and the Forest Service is under substantial pressure to reduce fire suppression expenditures.

In response to escalating wildfire management costs and recognition of the beneficial role of fire as an important ecological process, wildfire and fuel management policy in the United States has shifted from one based primarily on wildfire suppression to one that integrates suppression, hazardous fuels reduction, restoration and rehabilitation of fire adapted ecosystems and community assistance (USDI and USDA 2000, USDI *et al.* 2001, Western Governors' Association 2001, USDA *et al.* 2002, USDI *et al.* 2005). Nevertheless, effective implementation of these policies has been limited (Dale 2006; Steelman and Burke 2007). There is also acknowledgement of the need for improved accountability of wildfire management expenditures (USDA OIG 2006). To support economically efficient management of wildfires, fire managers need decision support tools capable of prioritizing areas where negative resource value change due to fire suggests aggressive suppression and those areas where beneficial fire effects or excessive suppression costs would suggest "let burn" strategies. However, existing fire budget and planning models used by U.S. federal agencies are inadequate in this regard (Review Team 2001), which is partly due to challenges in evaluating welfare change arising from wildfires and the limited number of studies performed to date (Venn and Calkin 2009).

This study contributes to the limited literature examining wildfire effects on human welfare by assessing how wildfire induced changes in environmental amenities and perceptions of wildfire risk are capitalized into home values in northwest Montana. Findings from this research can be used to support more efficient allocation of resources to wildfire preparedness and suppression activities, particularly near WUI areas in the northern Rocky Mountains. There are several characteristics of this hedonic price study of wildfire effects that make it unique. First, existing studies have been performed in areas where wildfires are infrequent, but often large and severe. This study was set in a region that frequently experiences wildfire, including large, severe conflagrations. Second, existing studies have focused on a single wildfire or wildfire complex. This study examined the effects of 256 wildland fires, larger than 4 ha (10 acres) that burned roughly 303,690 ha over 17 years in a 3.99 million ha study area. Third, homes from which residents and homebuyers could see a wildfire burned area were identified. Fourth, several environmental amenity variables, including proximity to lakes, golf courses and a ski resort have been accommodated in the hedonic model to more completely explain property values in northwest Montana.

The paper continues with a review of existing literature about the effects of wildfire on property values. Next, the study area in northwest Montana is described. Data collection and research methods are presented, and then findings are reported. Policy implications and concluding comments follow.

EFFECTS OF WILDFIRE ON PRIVATE HOME VALUES

Internationally, surprisingly few studies have been conducted to estimate welfare change as a consequence of wildfire. Glover and Jessup (1999) estimated the short-term health costs of the 1997 forest fires in Kalimantan and Sumatra, Indonesia. The social costs of fire use in the Amazon, including carbon emissions and impacts on human health, have been examined by de

Mendonça *et al.* (2004). In Victoria, Australia, Bennetton *et al.* (1998) assessed the market and non-market benefits of wildfire prevention and suppression, while Spring and Kennedy (2005) determined optimal rotations in a flammable multistand forest when fires degrade timber and habitat of an endangered species. Most of the limited research on the effects of wildfire on social welfare has been conducted in North America, where the focus has been on recreation values (Boxall *et al.* 1996, Englin *et al.* 2001, Loomis *et al.* 2001, Hesseln *et al.* 2003), the willingness of households to pay for fuel reduction programs that reduce the risk of damage to homes and natural amenities (Fried *et al.* 1999, Kim and Wells 2005, Loomis *et al.* 2005, Kaval and Loomis 2007, Kaval *et al.* 2007 and Walker *et al.* 2007), and environmental amenity and wildfire risk capitalized into private property values in the WUI.

The value of private homes in the WUI is a function of many property, neighborhood and environmental attributes, including perceived wildfire risk and environmental amenities (e.g. recreation opportunities and aesthetically pleasing vistas), that may be enhanced or diminished by wildfire. An extensive literature review revealed four studies that have attempted to quantify the effects of wildfire on private home values, and all have been conducted in the United States. The first study that specifically examined the relationship between wildfire and property values followed the Cerro Grande Fire of early June of 2000, which burned 17,400 ha and nearly 230 structures near Los Alamos, New Mexico (Price-Waterhouse Coopers 2001). This fire received much media attention because it was an escaped prescribed fire. In the aftermath of the fire, Price-Waterhouse Coopers undertook a study on behalf of the federal government to assess “whether the value of residential property that was not physically damaged by the Cerro Grande Fire declined as a result of the fire and if so, which communities and types of housing were most affected” (Price-Waterhouse Coopers 2001, p.3). Their analysis found that there was a 3% to 11% percent decline in single family residence property values in Los Alamos County following the fire. It should be noted that this study had a small data set of house sales from January 1996 to January 2001 (only 7 months post-fire) and did not employ the hedonic price method (HPM), but rather a pre-fire - post-fire regression analysis of home sale prices. Nonetheless, it was early evidence that wildfire can affect property values.

The first HPM analysis in the context of wildfire was performed by Huggett (2003) and looked at three large fires that together burned over 73,300 ha and destroyed 37 homes and 76 outbuildings during the summer of 1994 in Chelan County, Washington. The model accounted for risk and amenity variables such as distance to fire perimeter, distance to national forest boundary, slope and canopy cover. Huggett (2003) found the housing market did not register a decrease in property values until the first half of 1995, even though the fire was suppressed in September of the previous year. It was hypothesized that this could have been as a result of the fairly lengthy process that one goes through when buying a home, as well as imperfect information. In the first half of 1995 house prices increased by an average of \$156 (0.04%) per kilometer the home was distant from the final fire perimeter. It was also found that, while close proximity to wildfire perimeter reduced home value, close proximity of homes to the forest boundary still positively affected home values after the fires of 1994. Interesting, the negative effects of the fires on house prices were short-lived, only lasting six to twelve months.

The second HPM study conducted in a wildfire context examined the town of Pine, Colorado, which is southwest of Denver (Loomis 2004). The 4,900 ha Buffalo Creek fire burned in May of 1996, just two miles south of Pine. Loomis, like Huggett, was evaluating whether changes in

natural amenity levels and perceptions of fire risk had affected property values in town even though no homes in Pine burned down. Unlike Huggett, Loomis did not include environmental amenities in his model. The study found that five years after the fire, there was an \$18,519 or 16% loss in median home value in the study area relative to expected sale prices if there had been no fire. Loomis (2004, p.155) concluded “if this finding is replicated in other areas, the good news is that the housing market in the wildland urban interface is starting to reflect the hazards of living in these high-amenity forests”.

The third HPM study examined the effect of wildfire risk assessment ratings on property values rather than the direct effect of a wildfire. In 2000, the Colorado Springs Fire Department rated 35,000 structures in the WUI according to their wildfire risk level. Four main factors were used by the Colorado Springs Fire Department to determine the relative risk rating for each home: construction material (roof and siding); proximity to dangerous topography; vegetation around the house; and the average slope around the home. The risk assessment ratings of each property were then posted on the internet so that homeowners and potential home buyers could access them. Donovan *et al.* (2007) incorporated the risk factors used by the Colorado Springs Fire Department into a hedonic price model of house sale prices. The risk rating variables contain elements of both amenity and wildfire risk attributes, so it is difficult to determine the specific effects of amenities and wildfire risk separately. Nevertheless, Donovan *et al.* (2007) found homes that sold before the risk web site was operating had risk rating values that were both positive and significant. This suggested that the amenity benefits outweighed the perceived risks posed by wildfire. However, after the risk assessment rating web site was available to homebuyers, the risk rating values were no longer statistically significant. “This result suggests that post web site creation, the positive amenity effects were offset by the increased wildfire risk associated with such parcels” (Donovan *et al.* 2007, p. 228).

STUDY AREA

The study area for this research is nestled in the northern Rocky Mountains of northwest Montana, comprising Flathead, Lake, Sanders and Lincoln Counties, and the northern portion of Missoula County (excluding the city of Missoula). Illustrated in Figure 1 and referred to hereafter as northwest Montana, the study area covers 3.99 million hectares and includes three national forests, five wilderness areas and one national park. Table 1 summarizes land holdings in the study area by tenure. Northwest Montana ranges in elevation from 525 m to 3070 m above sea level. The climate in the study area is generally cold and wet in the winter, and warm and dry in the summer. Average annual precipitation of rain and snow varies between 2540 mm at high elevations and 300 mm in the valleys.

Mixed mesic and mixed subalpine forest types are dominant in the study area, although mixed xeric forests can be found on dry southern aspect sites at lower elevation (NRIS 2007). Species found in the mixed mesic forest type include Douglas-fir (*Pseudotsuga menziesii*), western larch (*Larix occidentalis*), ponderosa pine (*Pinus ponderosa*), grand fir (*Abies grandis*) and Engelmann spruce (*Picea engelmannii*) (Fisher *et al.* 1998). The mixed mesic forest type is characterized as having a ‘mixed severity’ fire regime and can experience both high frequency, low intensity and low frequency, high intensity fires (Brown *et al.* 2004). The mixed subalpine forest type includes lodgepole pine (*Pinus contorta*), subalpine fir (*Abies lasiocarpa*), Douglas-fir, Engelmann spruce and Whitebark pine (*Pinus albicaulis*) (Fisher *et al.* 1998). The mixed

subalpine forest type was historically (and is still predominantly) characterized by low frequency, high severity wildland fire (Brown *et al.* 2004). Ponderosa pine and Douglas-fir are the two dominant species in the mixed xeric forest type, which historically experienced high frequency, low intensity wildland fire (Brown *et al.* 2004).

Logging, mining and agriculture dominated the economy of northwest Montana for most of the 20th century, but a dramatic shift in the economic base to service industries has occurred since the 1980s (Swanson *et al.* 2003, Northwest Economic Development District 2007). Kalispell is the main regional center in northwest Montana, with a population of about 30,000 in the greater Kalispell area. In 2000, median household incomes in the study area ranged from a high of \$39,885 in Flathead County to a low of \$29,654 in Sanders County, which are low relative to the national median household income of \$44,334 (US Census Bureau 2008). Northwest Montana has also experienced strong population growth (22% between 1990 and 2000 to 131,500), particularly in the WUI (US Census Bureau 2008).

Among the predominant factors luring people to northwest Montana are the numerous and enviable natural amenities (Power and Barrett 2001, Swanson *et al.* 2003). These amenities are primarily located on the 2.9 M ha of public land in the study area, including Glacier National Park (GNP) and large wilderness and roadless areas in national forests. Northwest Montana caters to many recreation opportunities, including cross-country skiing, downhill skiing, hiking, backpacking, mountain biking, outfitter trips, whitewater rafting and hunting. Flathead Lake, the largest freshwater lake in the western United States, is a major recreation destination as well as summer home location (Flathead Lake Biological Station 1999, Northwest Economic Development District 2007).

Between 1990 and 2006, the Forest Service recorded 256 wildfires that each burned at least 4 ha and in aggregate burned 303,690ha (about 7.3%) of northwest Montana (USDA c.2006a). The fires burned principally during the fire seasons of 1994, 2000 and 2003³ on both public and private land, and ranged in size from less than one hectare up to 28,500 ha (USDA c.2006a). The larger fires were on the east side of the study area in and around Glacier National Park and the Bob Marshall Wilderness. Residents of northwest Montana have become accustomed to wildfire and smoky days during the summer.

APPLICATION OF THE HEDONIC PRICE METHOD TO NORTHWEST MONTANA

The hedonic price method (HPM) has been in use for at least 80 years (Berndt 1996), but a solid theoretical foundation for the HPM was not forthcoming until Rosen (1974) empirically demonstrated that goods can be valued on the basis of their characteristics as opposed to merely the good itself. Economic theory suggests that house sale prices can be estimated as a function of vectors of structural characteristics, S , neighborhood attributes, N , and environmental attributes, E . Thus, the hedonic price model for houses takes on the general form

$$\text{House Sale Price} = f(S, N, E)$$

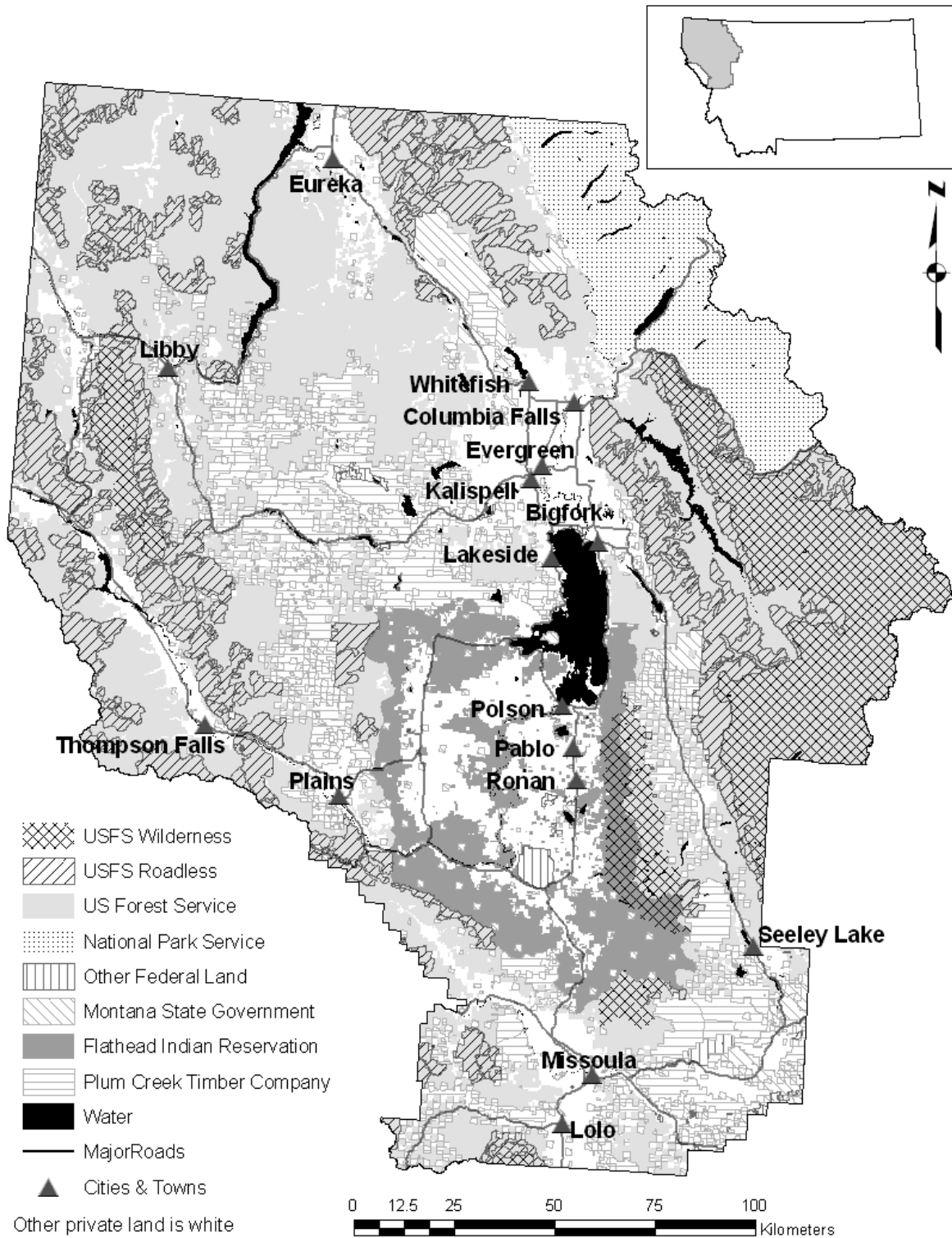
Consumers making a house purchase decision are assumed to maximize their utility, U , from the purchase of a home given the attributes of homes for sale and subject to their budget constraint, Y

$$\text{Max } U = f(S, N, E), \quad \text{subject to } Y = \text{House Sale Price} + a$$

where a is disposable income spent on all other goods.

³ The fire season in northwest Montana typically runs from June to September.

Figure 1. Land tenure and communities in northwest Montana



Source: Generated by the authors in ArcGIS with data from <http://www.nris.mt.gov/gis/gisdata/lib/gisDataList.aspx>

Table 1. Land tenure in Northwest Montana

Land tenure	Area (ha)	Proportion of study area
Forest Service National Forest land	1,157,230	29%
Forest Service Wilderness	404,360	10%
Forest Service Roadless	568,660	14%
Glacier National Park	250,670	6%
Bureau of Land Management	23,700	1%
Other Federal Agencies	14,940	1%
State of Montana	179,250	4%
Flathead Indian Reservation	288,890	7%
Plum Creek Timber Company	494,190	12%
Other Private Land	501,440	13%
Water	106,000	3%
Total Study Area	3,989,330	100%

Source: Land tenure estimates made by the author in ArcGIS with data from <http://nris.mt.gov/gis>

Structural, neighborhood, environmental and wildfire data for northwest Montana

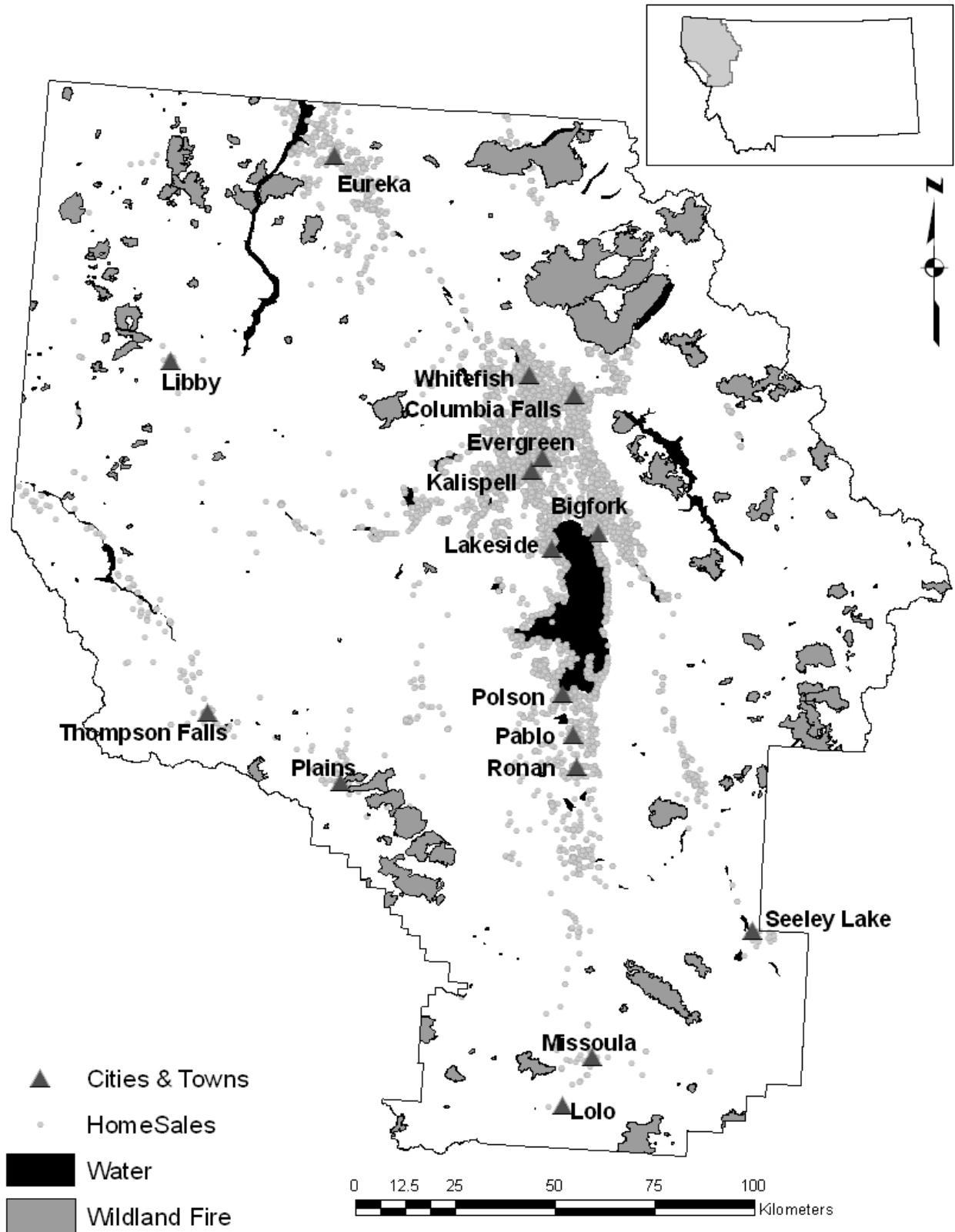
House sale prices, structural and neighborhood characteristics for 18,785 transactions in the study area over the period June 1996 to January 2007⁴ were acquired from the Northwest Montana Association of Realtors® (NMAR), a multiple listing service (MLS) group. This data was challenging to acquire, because Montana is a non-disclosure state. The dataset includes information about the number of bedrooms and bathrooms, square footage of the house, type of garage, age and style of the home, lot size, type of waterfront access, geospatial data, asking price, sold price, and list and sold date. Homes in the MLS dataset had also been assigned to one of 80 predetermined ‘housing zones’ (neighborhoods) defined by realtors according to their expert knowledge about property markets in northwest Montana. For the purposes of this study, five separate dummy variables were derived from these housing zones for homes in the urban areas of Kalispell, Columbia Falls, Whitefish, Bigfork and Polson.

The geospatial data for homes in the MLS dataset were verified with Montana Cadastral data [<http://www.nris.mt.gov/gis/gisdatalib/gisDataList.aspx>] and 2005 National Agriculture Imagery Program (NRIS 2008) aerial photographs, which highlighted a substantial number of houses with inaccurate geospatial data. The spatial data for these homes were corrected to facilitate spatial analysis of environmental and wildfire attributes. After deleting observations with missing or inaccurate price and structural data, 17,693 house sale transactions remained in the dataset. These are highlighted in Figure 2.

Throughout the study area, homes are typically located in valleys, and the nearest forest and previously burned areas are in the surrounding mountains. Neighborhood, environmental and wildfire attributes for homes were derived from spatial analysis with data acquired from the state of Montana Natural Resource Information System website (<http://nris.mt.gov/>), the Forest Service Northern Region Geospatial Library (<http://www.fs.fed.us/r1/gis/>) and the LANDFIRE project (<http://www.landfire.gov/>). Population density around each home was determined by spatially intersecting the homes with a 1 km by 1 km population density spatial raster layer for

⁴ Approximately half of the transactions in the dataset occurred since January 1 2003.

Figure 2. Home sales (June 1996 to January 2007) and wildfires (May 1990 to October 2006) in northwest Montana



Montana. Homes located on the Flathead Indian Reservation, adjacent to one of one of the 16 golf courses in the study area, and within the Big Mountain Ski Resort were identified. Straight-line distances of homes from national forest boundaries, the entrance to GNP, major lakes and rivers (including the large, navigable Flathead and Whitefish lakes), wilderness areas and wildfires were estimated⁵.

Wildfires are transient on the landscape, which had to be accommodated in the analysis. Wildfire perimeter data are available for the 256 wildfires that burned at least 4 ha over the period 1990 to 2006 (USDA c2006b), which are illustrated in Figure 2. A digital elevation model of the study area, combined with the wildfire polygons and home locations, facilitated assessment of distance of each home to the nearest wildfire perimeter and whether areas that had been burned by wildfires could be seen from the home. View of burned areas from homes was determined using the 'Viewshed' tool in ArcGIS 9.2. Above ground obstacles to view of burned areas from the home, such as vegetation and other structures, were not accommodated in the viewshed analysis. Distances from and views of wildfires were estimated after excluding all wildfires that burned after the sale date of the home, and all fires that burned greater than seven years before the sale of the home. Only the previous seven years of fire history for each home sale was included, because: (a) the nearest wildfire perimeter to almost all homes that sold prior to the 2000 fire season burned in 1994; (b) the nearest wildfire perimeter for almost all homes that sold since the 2000 wildfire season was a fire that had burned between the house sale date and the 2000 wildfire season; and (c) preliminary analysis revealed that if there were multiple wildfire burned areas within 20 km of a home that burned prior to and during or after the 2000 wildfire season, only wildfires that burned during or after 2000 had a statistically significant effect on house sale price (Stetler 2008)⁶. Data about the nearest fire to the home, such as fire size and date, were recorded for each home. The wildfire nearest the home was classified as being small (<405 ha / 1000 acres) or large (\geq 405 ha / 1000 acres). Fire date was used to estimate time since fire, i.e., time between when the fire nearest the home burned and when the house sold.

LANDFIRE percent canopy cover data at 30 m x 30 m spatial resolution was used to calculate the area of forest by canopy cover categories within 250m and 500m of each home (low: 0-40%; medium: 40-70%; high:>70%). Like Kim and Wells (2005), this indicator of stand density was used as a proxy for visual pleasantness and potential wildfire threat. Forest canopy cover around homes is also likely to be a sound proxy for obstacles to view of a wildfire burned area from a home in the WUI.

The wildfire risk and environmental amenity characteristics of homes may be partially explained by whether the home is located within the WUI. A spatial layer of land parcels that are charged

⁵ Incomplete GIS road layers in the study area prevented road distance (travel time) of homes to amenities and disamenities from being estimated. For many amenities and disamenities, including forests and areas previously burned by wildfire, straight-line distance is appropriate because the effect on home sale price is likely to be more related to spatial proximity than travel time.

⁶ The authors have not analyzed the data to explain point (c), but it may be due to substantially greater average wildfire size in northwest Montana since 2000 (USDA c2006b), which increased public consciousness and perception of wildfire risk since the early 2000s.

the Montana Department of Natural Resources and Conservation (DNRC) forest fire protection fee (along with their regular property taxes) was used to define the variable DNRC WUI⁷.

Northwest Montana Hedonic Price Model

Early specifications of the hedonic price model (HPM) for northwest Montana included all 17,693 observations, but a Chow test revealed structural differences between buyer preferences in the Kalispell metropolitan area relative to the rest of northwest Montana (Stetler 2008). Therefore, house sale prices are better explained by two separate models: one for Kalispell; and one for the rest of northwest Montana. The latter is relevant for examining the effects of wildfire and environmental amenities on property values, because of the dominating effect of urban amenities in Kalispell.

Stetler (2008) fitted several linear, semi-log and log-log HPMs to the 11,833 non-Kalispell observations. Numerous interaction variables were tested, including interactions of forest canopy cover and distance to fire, and time since fire and distance to fire, but none were statistically significant. The effect of distance to nearest wildfire perimeter on home sale prices was found to be better explained by discrete distance categories than a continuous distance variable. After assessing many potential wildfire distance category classifications, houses were assigned to one of the following five categories: 0 to 5 km⁸, 5 to 10 km, 10 to 15 km, 15 to 20 km and greater than 20 km. Total square footage of the home was found to be a better predictor of house sale prices than number of bedrooms and bathrooms, so the latter two variables were excluded from the final model. The following log-log specification, hereafter referred to as the ‘northwest Montana’ model, was found to have the greatest explanatory power.

$$\begin{aligned}
 \ln(\text{soldprice}_i) = & \beta_0 + \beta_1 \ln(\text{sqft})_i + \beta_{2-9} \text{age}_i + \beta_{10} \ln(\text{lotsize})_i + \beta_{11-20} \text{style}_i \\
 & + \beta_{21-27} \text{garage}_i + \beta_{28-71} \text{saleqtr}_i + \beta_{72} \text{days_on_ma}_i + \beta_{73} \text{whitefish}_i \\
 & + \beta_{74} \text{polson}_i + \beta_{75} \text{bigfork}_i + \beta_{76} \text{cfalls}_i + \beta_{77} \ln(\text{density})_i + \beta_{78} \text{bigmt}_i \\
 & + \beta_{79} \text{golf}_i + \beta_{80} \text{reservation}_i + \beta_{81} \text{wildernesskm}_i + \beta_{82} \text{natforestkm}_i \\
 & + \beta_{83} \text{gnpentrncekm}_i + \beta_{84} \text{navigable}_i + \beta_{85} \text{navflthdwhfsh}_i + \beta_{86} \text{nonnav}_i \\
 & + \beta_{87} \text{lakedistkm}_i + \beta_{88} \text{lakedistsqr}_i + \beta_{89} \text{lakedistcub}_i + \beta_{90} \text{dnrcwui}_i + \beta_{91} \text{view}_i + \beta_{92} \\
 & \text{bigfire}_i + \beta_{93} \text{zero5km}_i + \beta_{94} \text{five10km}_i + \beta_{95} \text{ten15km}_i + \beta_{96} \text{fifteen20km}_i \\
 & + \beta_{97} \text{qtrsincfire}_i + \beta_{98} \text{qtrsincfire}^2_i + \beta_{99} \text{250m_medcc}_i + \beta_{100} \text{250m_highcc}_i \\
 & + \beta_{101} \text{500m_medcc}_i + \beta_{102} \text{500m_highcc}_i + \beta_{103} \text{250m_medccsqr}_i \\
 & + \beta_{104} \text{250m_highccsqr}_i + \beta_{105} \text{500m_medccsqr}_i + \beta_{106} \text{500m_highccsqr}_i + e_i
 \end{aligned}$$

⁷ Stetler (2008) found the Forest Service defined WUI for northwest Montana was a statistically insignificant predictor of house sale price. Upon inspection, it became apparent that the Forest Service WUI spatial layer is inaccurate for the study area.

⁸ There were few observations within 1 km of a wildfire and preliminary analysis revealed that the effect on house sale price of being within 2.5 km of a wildfire was not statistically significantly different from being within 5 km of a wildfire.

The dependent and independent variables are defined in Table 2. Heteroskedasticity in the model has been corrected for by calculating Huber-White robust standard errors. Robustness tests revealed the statistical significance and coefficient levels of explanatory variables were insensitive to changes in model specification (Stetler 2008).

It was hypothesized that the explanatory power of particular wildfire variables may be sensitive to whether a wildfire burned area could be seen from the home. This was tested with the alternative model specifications ‘with view of fire’ and ‘without view of fire’, which was the northwest Montana model fitted only to home data from which a wildfire burned area could and could not be seen, respectively.

RESULTS

The variable coefficients, t-statistics and shadow prices of statistically significant variables for the ‘northwest Montana’, ‘with view of fire’ and ‘without view of fire’ models are reported in Table 3. Because of space limitations, coefficients for large groups of statistically significant dummy variables for age of the home, style of the home, garage type, and sale quarter are not reported, but are available from the authors. Importantly, the sale quarter variable captures the effects of the property boom in northwest Montana from 2002 to the first quarter of 2007, during which our model estimated mean house sale prices rose 164%.

Table 2. Definitions of dependent and independent variables

Variable name	Definition
Dependent variable	
<i>soldprice</i>	Sale price of the home (\$)
Structural variables	
<i>sqft</i>	Square footage of the home
<i>age</i>	Nine dummy variables that accounted for age ranges of the homes
<i>lotsize</i>	Size of the lot (ha)
<i>style</i>	Ten dummy variables that represent different home styles
<i>garage</i>	Eight dummy variables that account for different types of garages
<i>saleqtr</i>	The quarter that the house sold from 1 (June to September 1996) to 44 (January 2007)
<i>days_on_ma</i>	The number of days that the house was on the market
Neighborhood variables	
<i>whitefish</i>	Whitefish town dummy variable: MLS Housing Zones 51A, 51B, 52A, 53A, 54A
<i>polson</i>	Polson town town dummy variable: MLS Housing Zones 81A, 82A, 81E, 81W, 82B
<i>bigfork</i>	Bigfork town town dummy variable: MLS Housing Zones 21,22,41
<i>cfalls</i>	Columbia Falls town town dummy variable: MLS Housing Zones 32, 33, 34A, 34B
<i>density</i>	Population density in the 1km x 1km census block in which the house is located (people/km ²)
<i>bigmtn</i>	Dummy for whether the property is located at The Big Mountain Ski Resort

<i>golf</i>	Dummy for whether the property is located within 750m of a golf course
<i>reservation</i>	The property is located on the Flathead Indian Reservation
Environmental amenity variables	
<i>wildernesskm</i>	Straight line distance to the nearest wilderness area boundary (km)
<i>natforestkm</i>	Straight line distance to the nearest National Forest boundary (km)
<i>gnpentnrncekm</i>	Straight line distance to the entrance of Glacier National Park (km)
<i>navigable</i>	The property had access to a navigable waterfront
<i>navflthdwfsh</i>	Property had navigable water access on Flathead or Whitefish Lake only
<i>nonnav</i>	The property had water frontage, but not a navigable waterfront
<i>lakedistkm</i>	Straight line distance to the nearest lake
<i>lakedistsqr</i>	$(lakedistkm)^2$
<i>lakedistcub</i>	$(lakedistkm)^3$
Wildfire variables	
<i>dnrcwui</i>	Dummy variable for whether the home is assessed the DNRC forest fire protection fee
<i>view</i>	Dummy variable for whether the home had view of a previously burned area.
<i>bigfire</i>	Dummy variable for whether the closest fire to the home was ≥ 1000 acres
<i>zero5km</i>	Dummy variable for whether the home is 0-5 km from a wildfire burned area
<i>five10km</i>	Dummy variable for whether the home is 5-10 km from a wildfire burned area
<i>ten15km</i>	Dummy variable for whether the home is 10-15 km from a wildfire burned area
<i>fifteen20km</i>	Dummy variable for whether the home is 15-20 km from a wildfire burned area
<i>qtr_since_fire</i>	Time in quarters between the time the nearest fire occurred and the time the house sold
<i>qtr_since_fire2</i>	$(qtr_since_fire)^2$
<i>250m_medcc</i>	Area of 40-70% tree canopy cover within 250 meters of the home (ha)
<i>250m_highcc</i>	Area of 70-100% tree canopy cover within 250 meters of the home (ha)
<i>500m_medcc</i>	Area of 40-70% tree canopy cover between 250 and 500 meters from the home (ha)
<i>500m_highcc</i>	Area of 70-100% tree canopy cover between 250 and 500 meters from the home (ha)
<i>250m_medccsqr</i>	$(250m_medcc)^2$
<i>250m_highccsqr</i>	$(250m_highcc)^2$
<i>500m_medccsqr</i>	$(500m_medcc)^2$
<i>500m_highccsqr</i>	$(500m_highcc)^2$

Table 3. Regression estimates and shadow prices for the northwest Montana, with view of fire and without view of fire models

Variable	Northwest Montana model			With view of fire model			Without view of fire model		
	β	t-stat	Shadow price (\$)	β	t-stat	Shadow price (\$)	β	t-stat	Shadow price (\$)
ln(sqft)	0.59	58.78	78/ft ²	0.587	35.17	84/ft ²	0.587	47.74	72/ft ²
ln(lotsize)	0.297	40.2	38558/ha	0.306	24.6	41524/ha	0.292	32.34	35592/ha
days_on_ma	0	-4.67	-23/day	0	-2.26	-23/day	0	-3.67	-19/day
whitefish	0.283	20.12	84947	0.366	10.05	123695	0.261	14.87	71488
bigfork	0.208	14.95	60135	0.201	8.55	62316	0.213	11.59	57049
cfalls	0.066	4.64	17806	0.044	1.89	12533	0.074	3.93	18452
ln(density)	-0.028	-8.96	-9/per/km ²	-0.038	-7.85	-13/per/km ²	-0.018	-4.41	-5/per/km ²
bigmtn	0.52	17.36	177368	0.535	8.99	198153	0.497	13.93	154486
golf	0.179	9.79	50864	0.212	5.63	66056	0.176	8.33	46146
reservation	-0.109	-4.85	-26900	-0.16	-4.7	-41308	-0.004	-0.12	-951
wildernesskm	-0.004	-12.08	-952/km	-0.003	-7.65	-950/km	-0.004	-8.88	-958/km
natforestkm	-0.009	-5.69	-2437/km	-0.009	-3.37	-2514/km	-0.01	-4.38	-2336/km
gnpentrncekm	-0.002	-8.63	-474/km	-0.002	-5.77	-475/km	-0.002	-5.36	-449/km
navigable	0.605	31.63	216284	0.638	15.89	249878	0.6	27.83	197188
navflthdwtfsh	0.373	14.34	117455	0.438	7.98	154080	0.359	12.28	103710
nonnav	0.128	11.99	35402	0.141	7.76	42338	0.125	9.56	32024
lakedistkm	-0.041	-16.76	-10597/km	-0.031	-6.6	-8655/km	-0.044	-12.2	-10525/km
lakedistsqr	0.002	9.38	405/km	0.001	3.28	301/km	0.002	5.75	399/km
lakedistcub	0	-6.07	-4/km	0	-1.86	-3/km	0	-3.28	-4/km
dnrcwui	-0.028	-3.08	-7109	-0.066	-4.25	-17875	-0.004	-0.33	-896
view	-0.025	-2.92	-6480	NA	NA	NA	NA	NA	NA
bigfire	-0.035	-3.41	-8928	-0.056	-2.72	-15363	-0.028	-2.31	-6731
zero5km	-0.136	-4.65	-33053	-0.148	-3.9	-38406	-0.104	-1.94	-23724
Five10km	-0.075	-5.32	-18884	-0.098	-4.67	-26048	-0.03	-1.36	-7169
qtrsincfire2	0	-2.84	-47/quarter	0	-1.92	-60/quarter	0	-2.56	-49/quarter
250m_medcc	0.016	3.44	4197/ha	0.03	3.36	8626/ha	0.006	1.03	1358/ha
500m_medcc	-0.005	-2.97	-1363/ha	-0.005	-1.62	-1413/ha	-0.003	-1.54	-830/ha
250m_medccsqr	-0.001	-2.32	-235/ha	-0.003	-3.33	-699/ha	0	0.23	26/ha
R ²			0.817			0.828			0.818
AIC			0.603			0.609			0.582
BIC			7871.48			3180.79			5152.28
N			11817			4173			7644

Table 4 lists summary statistics for the dependent and independent variables in the three models. Notably, homes with a view of a wildfire burned area have the highest mean sale price of \$280,000. This can largely be explained by the fact that these homes had larger mean square footage and lot sizes than for northwest Montana as a whole, and that many of these homes have

unique architecture and construction materials, and high environmental amenity values (such as sweeping scenic vistas) that are not completely captured by the structural and environmental amenity variables in the HPM. Anecdotal evidence also suggests a substantial number of these homes may have sale price premiums associated with them being out-of-state purchases, although we have inadequate data to support this assertion.

Shadow prices have been derived from the mean house sale prices of \$260,000 in the ‘northwest Montana’ model, \$280,000 in the ‘with view of fire’ model and \$240,000 in the ‘without view of fire’ model, and are interpreted from the mean level of the independent variable. The shadow price for a continuous linear variable is estimated by multiplying the mean house sale price by the coefficient estimate. Thus, in the ‘northwest Montana’ model, for every day longer that a home spent on the market (*days_on_market*), average sale price reduce by \$23 ($\$260,000 * -0.00008$). Shadow prices for dummy variables are estimated as the mean sale price multiplied by $e^{\beta}-1$, where β is the coefficient for the dummy variable of interest. Thus, in the ‘northwest Montana’ model, homes adjacent to a golf course were on average valued at \$50,864 ($\$260,000 * e^{0.179}-1$) more than homes not adjacent to a golf course, *ceteris paribus*. Logged independent variables must first be scaled to represent a unit to unit change by multiplying the coefficient of the independent variable by the mean of the dependent variable divided by the mean of the independent variable. Thus, the shadow price for lot size in the ‘northwest Montana’ model is \$38,558 ($0.297*(260,000/2)$), which is the expected increase in the mean house sale price for a 1 ha increase in lot size, *ceteris paribus*.

Table 4. Summary statistics for the northwest Montana, with view of fire and without view of fire models

Variable	Northwest Montana model				With view of fire model				Without view of fire model			
	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.
soldprice	260000	3.50E+05	10000	1.40E+07	280000	4.20E+05	10000	1.40E+07	240000	3.10E+05	12000	8.20E+06
sqft	1966.4	1022.2	128	15500	2024	1078.19	150	15500	1934.9	989.02	128	10000
lotsize	2	6.34	0	147.72	2.42	7.68	0	147.72	1.77	5.47	0	129.5
days_on_ma	192.55	187.37	0	2263	180.4	168.37	0	1830	199.17	196.66	0	2263
whitefish	0.22	0.41	0	1	0.08	0.27	0	1	0.3	0.46	0	1
bigfork	0.09	0.28	0	1	0.11	0.31	0	1	0.07	0.26	0	1
cfalls	0.12	0.33	0	1	0.15	0.36	0	1	0.11	0.31	0	1
density	834.33	1094.6	0	7010.21	714.67	1.77	-4.61	8.86	899.66	1.72	-3	8.79
bigmntn	0.01	0.12	0	1	0.01	0.11	0	1	0.01	0.12	0	1
golf	0.03	0.18	0	1	0.02	0.13	0	1	0.04	0.2	0	1
reservation	0.06	0.24	0	1	0.12	0.32	0	1	0.03	0.17	0	1
wildernesskm	30	15.66	0.49	81.24	29.78	20.26	0.75	81.24	30.12	12.46	0.49	77.46
natforestkm	4.62	4.52	0	28.71	4.88	5.16	0	28.71	4.49	4.13	0	25.23
gnpentrncekm	54.05	31.98	0.41	194.42	65.52	37.03	0.41	188.24	47.79	26.86	0.65	194.42
navigable	0.13	0.33	0	1	0.09	0.28	0	1	0.15	0.35	0	1
navflthdwtfish	0.06	0.24	0	1	0.04	0.21	0	1	0.07	0.25	0	1
nonnav	0.12	0.33	0	1	0.12	0.33	0	1	0.12	0.33	0	1
lakedistkm	5.09	6.53	0	58.07	6.42	7.76	0	51.86	4.36	5.61	0	58.07
lakedistsqr	68.48	230.82	0	3371.8	101.4	323.07	0	2689.8	50.53	156.45	0	3371.8
lakedistcub	1653.8	10262	0	2.00E+05	2889	15339.15	0	1.40E+05	979.69	5752.49	0	2.00E+05
dnrcwui	0.55	0.5	0	1	0.49	0.5	0	1	0.57	0.49	0	1
view	0.35	0.48	0	1	NA	NA	NA	NA	NA	NA	NA	NA
bigfire	0.57	0.49	0	1	0.7	0.46	0	1	0.5	0.5	0	1
zero5km	0.02	0.15	0	1	0.05	0.21	0	1	0.01	0.09	0	1
five10km	0.08	0.27	0	1	0.14	0.35	0	1	0.04	0.2	0	1
ten15km	0.18	0.39	0	1	0.27	0.44	0	1	0.14	0.34	0	1
fifteen20km	0.2	0.4	0	1	0.18	0.39	0	1	0.21	0.41	0	1
qtrssincefire	10.82	7.58	-0.8	27.85	11.98	7.26	-0.52	27.85	10.18	7.67	-0.8	27.82
qtrssincefire ²	174.41	204.39	0	775.43	196.2	199.91	0	775.43	162.54	205.83	0	774.21
250m_medcc	3.14	3.31	0	18	2.77	3.34	0	16.56	3.35	3.28	0	18
500m_medcc	9.57	8.79	0	45.09	8.65	9.17	0	44.31	10.08	8.53	0	45.09
250m_medccsq	20.85	32.94	0	324	18.82	32.29	0	274.23	21.96	33.24	0	324

Contribution of neighborhood and environmental amenities to property values in the 'northwest Montana' model

Homes in the towns of Whitefish, Bigfork and Columbia Falls have higher sale prices relative to the rest of the study area, *ceteris paribus*. Columbia Falls and Bigfork are both recreational hotspots that provide access to Flathead Lake, while Whitefish is a year-round destination town with skiing in the winter and Whitefish Lake recreational opportunities in the summer. Whitefish homes had the largest price premium, with values 28% (\$84,947) higher than homes outside Whitefish, Bigfork and Columbia Falls.

Environmental amenities are found to have a large effect on property values in northwest Montana. Living further away from national forests (*natforestkm*), wilderness areas (*wildernesskm*) and the entrance to GNP (*gnpentrnckm*) had a detrimental effect on home sale price, all else equal. Living close to a lake (*lakedistkm*), as well as having navigable (*navigable*) or non-navigable (*nonnav*) waterfront access, is important to home buyers. If the home has a navigable waterfront, this was found to increase mean house sale price by \$216,284, all else constant. Homes with navigable waterfront access on either Flathead Lake or Whitefish Lake (*navflthdwtfsh*) had an additional \$117,455 price premium. Although structural variables have been included in the model, part of the estimated waterfront home sale price increases from the mean is likely to be reflecting particular structural attributes of these homes (e.g. very large home with unique and aesthetically pleasing style and building materials). Homes adjacent to a golf course (*golf*) or within the Big Mountain Ski Resort (*bigmtn*) also had substantially higher home sale prices relative to other homes, all else equal. However, sale prices of homes on the Flathead Indian Reservation (*reservation*) were \$26,900 less than the mean, *ceteris paribus*.

Effect of wildfire and perceived wildfire threat on property values in the 'northwest Montana' model

Wildfire has had a dramatic effect on home sale prices in northwest Montana. The 'northwest Montana' model suggests sale prices of homes within five kilometers of a wildfire burned area (*zero5km*) were 12.7% (\$33,053) lower than equivalent homes at least 20 km from a fire. Sale prices of homes between 5 km and 10 km (*five10km*) from a wildfire burned area were 7.3% (\$18,884) lower than equivalent homes at least 20 km from a fire. Sale prices of homes between 10 km and 15 km, and 15 km and 20 km from the nearest wildfire burned area were not statistically significantly affected by wildfire.

Having a view of a wildfire burned area (*view*) decreased the mean sale price of a home by \$6480 relative to a home without a view of a burned area, all else equal. The statistical significance of *bigfire* indicates that proximity to large wildfires negatively affects homebuyer willingness to pay more than proximity to small wildfires, *ceteris paribus*. Properties that pay the DNRC WUI fire protection fee have mean sale prices \$7109 lower than homes that do not, all else constant. Given that these fees are typically less than \$50/household/year, this variable is capturing more than capitalization of the fee into the sale price. The fee is levied only from properties close to large forested areas and may be accounting for several disamenities, including remoteness from urban amenities, and increased perception of wildfire risk.

The variable *qtrsincefire* was found to be statistically insignificant. However, *qtrsincefire*² was found to be statistically significant and negative, implying house prices decrease with time since the nearest wildfire to the home burned. This counter-intuitive result is small (0.018% or \$47 per quarter since fire) and, for all intents and purposes, is zero. This suggests recovery of house sale

prices with time since fire in northwest Montana takes considerable time (greater than the maximum period of seven years post-fire examined in this study), which is consistent with house sale price trends following wildfire in Colorado (Loomis 2004). Since seven years is a short period of time relative to the time required for recovery of northern Rocky Mountain forest ecosystems from wildfire, it is perhaps not surprising that the time since fire variables are either statistically insignificant or small.

Like Kim and Wells (2005), medium density canopy cover was found to be positive and significant for house price relative to low canopy density, although only within 250m of the home. Medium canopy cover is a disamenity between 250m and 500m of a home. This suggests that the amenity aspect of trees, including shade, privacy and aesthetic value, outweighs disamenities like wildfire risk for trees close to a home. However, disamenities associated with medium density canopy cover outweigh the amenity benefits of trees further from the home (250m-500m). The effect of high density canopy cover on property values was not statistically significantly different from low density canopy cover. This may be due to the small area of high canopy cover forest near homes in the study area (Table 4).

The ‘with’ and ‘without view of wildfire’ models

Structural, neighborhood and environmental amenity variables for the ‘with view of fire’ and ‘without view of fire’ models are consistent with the ‘northwest Montana’ model. The with and without view models highlight the importance of view of wildfire burned areas on environmental amenity values and wildfire risk perceptions, as capitalized into home sale price. The negative coefficients for *dnrcwui*, *bigfire*, *zero5km* and *five10km* all increased in the ‘with view of fire’ model. Canopy cover variables also remained statistically significant. An increase in medium canopy density cover within 250 m of a home is projected to add substantially more to the value of a home with a view of a burned area than in the ‘northwest Montana’ model. This may be capturing aesthetic and lower wildfire risk perception benefits associated with the view of burned areas being interrupted by tree cover near the home. In the ‘without view of fire’ model, only *bigfire* remained statistically significant; *dnrcwui*, *zero5km*, *five10km* and all canopy cover variables became statistically insignificant.

POLICY IMPLICATIONS AND CONCLUSIONS

Wildfires have had large, persistent and negative effects on property values in northwest Montana, which is consistent with previous research in Colorado (Loomis 2004). This reduction arises from changes in the quality of environmental amenities (e.g. aesthetics and recreation opportunities) and in perceived wildfire risk. It is impossible to determine the relative magnitudes of these two effects with the revealed preference data available for this study; however, indications from the magnitude of decrease in home sale price from proximate large wildfires (\$33,053 within 0-5km of a wildfire) compared to the increase associated with proximity to public lands (\$2,437 increase for every kilometer closer to national forest than the average of 4.62 km) indicates that much of the price loss may be associated with increased perception of wildfire risk. Stated preference research is required to resolve this interpretation dilemma and begin to answer questions about how the public would like wildfire and environmental amenities to be managed.

The statistically significant and large negative effects of wildfire variables in the ‘with view of fire’ model, coupled with the insignificance of the same variables in the ‘without view of fire’

model does support an argument that homebuyers may correlate view of and closer proximity to burned areas with increased wildfire risk. When burned areas are out of sight, wildfire risk appears to be out of mind. Of course, due to modification of fuels, a home that is proximate to a recently burned area is likely to have lower future wildfire risk than a similar home where no wildfire has occurred. Thus, misguided wildfire risk perceptions of homebuyers may be increasing demand for WUI homes in areas of greater future wildfire risk. An investigation of how homebuyer willingness to pay is affected by perceived wildfire risk and how closely perceptions compare with actual wildfire risk (as determined by computer simulation or expert opinion) would be interesting avenues for future research and may highlight the desirability of a wildfire risk education campaign.

The out of sight, out of mind mentality of homebuyers in northwest Montana does suggest opportunities for wildfire management authorities to implement *wildland fire use* techniques under suitable fire weather conditions when the fire is outside the viewshed of homes. With homebuyers indicating a preference for medium canopy density stands within 250 m of a home when a wildfire burned area can be seen from a home, it appears that moral suasion and government incentive programs for landowners to perform fuel treatments around their home may be positively received in the study area. This is consistent with a stated preference study that estimated the willingness of Montanan WUI households to pay for prescribed fire and mechanical thinning to reduce fuels on adjacent public land (Loomis *et al.* 2005). However, 'Fire Wise' education campaigns may be necessary to encourage homeowners without views of wildfire burned areas to thin their stands.

Dramatic population increase within Northwest Montana during the period of analysis was largely driven by high quality environmental amenities (Power and Barrett 2001, Swanson *et al.* 2003). The importance of these attributes was further confirmed by this study. Public fire management is currently being challenged by the needs to protect communities within the public-private interface and the primary missions of the various land management agencies in protecting natural resource values (including consideration of the beneficial effects of wildfire). USDA OIG (2006) specifically highlighted this challenge and argued that the Forest Service has given defacto priority to the protection of private property despite policy that recommends equal consideration with natural resource values.

Taken at face value, the results of this study may indicate that increased funding for aggressive suppression of all wildfires within 10 km of residential development is the most economically efficient response, given the large and growing value of the housing stock in these fire prone areas. However, prioritization of aggressive wildfire suppression in all areas proximate to homes poses three dilemmas: 1) Fire suppression and exclusion will further exacerbate hazardous fuels conditions and create conditions where future wildfires will be more difficult to suppress (Reinhardt *et al.* 2008); 2) Priority given to manage the natural resources that have been largely responsible for increased migration to northwest Montana would need to be reduced given existing budget constraints; and 3) Federal funding of wildfire suppression in the WUI transfers wealth from society at large to a comparatively small number of homeowners. These dilemmas suggest that a more effective response may be to better manage residential development patterns, and improve public understanding of wildfire and our ability to live and recreate within fire adapted ecosystems.

This study focused on the northern Rocky Mountains of the western United States. Similar studies in other wildfire-prone areas with large and growing WUI communities, including parts of Canada and Australia, are likely to be useful in supporting efficient allocation of resources to wildfire preparedness and suppression activities through: (a) providing an estimate of the magnitude of private home value change due to wildfire effects on the quality of environmental amenities and perceived wildfire risk; (b) highlighting fuels and wildfire management strategies likely to be more acceptable to residents of the WUI; and (c) identifying misguided wildfire risk perceptions and whether homebuyers prefer home attributes that are positively correlated with wildfire risk.

ACKNOWLEDGEMENTS

We would like to thank the USDA Forest Service Rocky Mountain Research Station for funding this research and the Northwest Montana Association of Realtors for providing the Multiple Listing Service data. We also gratefully acknowledge the GIS support provided by Mike Sweet (College of Forestry and Conservation, The University of Montana) and econometric support from Doug Dalenberg (Department of Economics, The University of Montana).

REFERENCES

- Bennetton, J., Cashin, P., Jones, D. and Soligo, J. 1998. 'An economic evaluation of bushfire prevention and suppression', *The Australian Journal of Agricultural and Resource Economics*, 42(2): 149-75.
- Beringer, J. 2000. 'Community fire safety at the urban/rural interface: the bushfire risk', *Fire Safety Journal*, 35(1): 1-23.
- Berndt, E. 1996. *The Practice of Econometrics: Classic and Contemporary*. New York: Addison-Wesley Publishing Company.
- Boxall, P. C., Watson, D. O. and Englin, J. E. 1996. 'Backcountry recreationists' valuation of forest and park management features in wilderness parks of the western Canadian Shield', *Canadian Journal of Forest Research*, 26(6): 982-990.
- Brenkert-Smith, H., Champ, P.A., Flores, N. 2006. Insights into wildfire mitigation decisions among wildland-urban interface residents. *Society and Natural Resources*. 19(8): 759-768.
- Calkin, D. E., Gebert, K. M., Jones, G. and Neilson, R. P. 2005. 'Forest service large fire area burned and suppression expenditure trends, 1970-2002', *Journal of Forestry*, 103(4): 179-183.
- Dale, L. 2006. Wildfire policy and fire use on public lands in the United States. *Society and Natural Resources* 19(3): 275-284.
- de Mendonça, M. J. C., Diaz, M. C. V., Nepstad, D., da Motta, R. S., Alencar, A., Gomes, J. C. and Ortiz, R. A. 2004. 'The economic cost of the use of fire in the Amazon', *Ecological Economics*, 49(1): 89-105.
- Donovan, G.H., Champ, P.A., and Butry, D.T. 2007. Wildfire risk and housing prices: a case study from Colorado Springs. *Land Economics*. 83(2): 217-233.
- Englin, J. E., Loomis, J. B. and González-Cabán, A. 2001. 'The dynamic path of recreational values following a forest fire: a comparative analysis of states in the Intermountain West', *Canadian Journal of Forest Research*, 31(10): 1837-1844.
- Fisher, F.B., Winne, J.C., Thornton, M.M., Tady, T.P., Ma, Z., Hart, M.M. and Redmond, R.L. 1998. *Montana Land Cover Atlas*. The Montana GAP Analysis Project. Missoula. pp. 1-62.

- Flathead Lake Biological Station – The University of Montana. c. 1999. About FLBS Available at URL: <http://www.umt.edu/flbs/aboutflbs/flatheadlake.htm>, accessed February 22, 2008.
- Frentz, I.C., Farmer, F.L., Guldin, J.M. and Smith, K.G. 2004. Public lands and population growth. *Society and Natural Resources*. 17(1): 57-68.
- Fried, J. S., Winter, G. J. and Gillies, J. K. 1999. 'Assessing the benefits of reducing fire risk in the wildland-urban interface: A contingent valuation approach', *International Journal of Wildland Fire*, 9(1): 9-20.
- Glover, D. and Jessup, T. (eds). 1999, *Indonesia's Fires and Haze: the Cost of Catastrophe*. Ottawa, Institute of Southeast Asian Studies, Singapore and International Development Research Centre.
- Hammer, R.B., Radeloff, V.C., Fried, J.S., Stewart, S.I. 2007. Wildland-urban interface housing growth during the 1990s in California, Oregon, and Washington. *International Journal of Wildland Fire*. 16(3): 255-265.
- Handmer, J. and Tibbits, A. 2005. 'Is staying at home the safest option during bushfires? Historical evidence for an Australian approach', *Environmental Hazards*, 6(2): 81-91.
- Hesseln, H., Loomis, J. B., González-Cabán, A. and Alexander, S. (2003). 'Wildfire effects on hiking and biking demand in New Mexico: a travel cost study', *Journal of Environmental Management*, 69(4): 359-368.
- Huggett, R.J. 2003. *Fire in the Wildland Urban Interface: An Examination of the Effects of Wildfire on Residential Property Markets*. PhD. Dissertation. North Carolina State University: Department of Economics. pp.1-136.
- Hunter, L.M., Boardman, J.D., Onge, J.M.S. 2005. The association between natural amenities, rural population growth, and log-term residents' economic well-being. *Rural Sociology*. 70(4): 452-469.
- Kaval, P. and Loomis, J. 2007. 'The relationship between well-being and wildfire', *International Journal of Ecological Economics and Statistics*, 7(W07): 29-43.
- Kaval, P., Loomis, J. and Seidl, A. 2007. 'Willingness to pay for prescribed fire in the Colorado (USA) wildland urban interface', *Forest Policy and Economics*, 9(8): 928-937.
- Kim, Y., Wells, A. 2005. The impact of forest density on property values. *Journal of Forestry*. 103(3): 146-151.
- Liang, J., Calkin, D. E., Gebert, K. M., Venn, T. J. and Silverstein, R. P. 2008. 'Factors influencing large wildland fire suppression expenditures', *International Journal of Wildland Fire*, 17(5): 650-659.
- Loomis, J. 2004. Do nearby forest fires cause a reduction in residential property values? *Journal of Forest Economics*. 10(3): 149-157.
- Loomis, J. B., González-Cabán, A. and Englin, J. E. 2001. 'Testing the differential effects of forest fires on hiking and mountain biking demand and benefits', *Journal of Agricultural and Resource Economics*, 26(2): 508-522.
- Loomis, J. B., Le, H. G. and González-Cabán, A. 2005. 'Testing transferability of willingness to pay for forest fire prevention among three states of California, Florida and Montana', *Journal of Forest Economics*, 11(3): 125-140.
- Maguire, L. A. and Albright, E. A. 2005. 'Can behavioural decision theory explain risk-averse fire management decisions?' *Forest Ecology and Management*, 211(1-2): 47-58.
- Marcouiller, D.W. Kim, K. and Deller, S.C. 2004. Natural amenities, tourism and income distribution. *Annals of Tourism Research*. 31(4): 1031-1050.
- Mason, C.L., Lippke, B.R., Zobrist, K.W., Bloxton Jr. T.D., Ceder, K.R., Comnick, J.M., McCarter, J.B. and Rogers, H.K. 2006. Investments in fuel removals to avoid forest fire result in substantial benefits. *Journal of Forestry*. 104(1): 27-31.

- McCaffrey, S. 2004. Thinking of wildfire as a natural hazard. *Society and Natural Resources*. 17(6): 509-516.
- McCool, S.F., Burchfield, J.A., Williams, D.R. and Carroll, M.S. 2006. An event based approach for examining the effects of wildland fire decisions on communities. *Environmental Management*. 37(4): 437-450.
- McGee, T. K. (2007). 'Urban residents' approval of management measures to mitigate wildland-urban interface risks in Edmonton, Canada', *Landscape and Urban Planning*, 87(4): 247-256.
- Mercer, D.E. and Prestemon, J.P., 2005. Comparing production function models for wildfire risk analysis in the wildland-urban interface. *Forest Policy and Economics*. 7(5): 782-795.
- National Academy of Public Administration (2002), *Wildfire Suppression: Strategies for Containing Costs*, National Academy of Public Administration, Washington, D.C.
- NIFC – c.2008. National Interagency Fire Center. Fire Information – Wildland Fire Statistics. Available at URL: http://www.nifc.gov/fire_info/fire_stats.htm, accessed January 14, 2008.
- Northwest Economic Development District. 2007. *Regional Comprehensive Economic Development Strategy*. Northwest Resource Conservation District. Libby. pp.1-138.
- NRIS – c.2007. State of Montana Natural Resource Information System. Available at URL: <http://nr.is.mt.gov/gis/gisdata/lib/gisDataList.aspx>, accessed February 22, 2008.
- NRIS – c.2008. State of Montana Natural Resource Information System – NAIP Data. Available at URL: <http://gisportal.mt.gov/Portal/DiscoveryServlet>
- Power, T.M. and Barrett, R.N. 1999. *Post-Cowboy Economics: Pay and Prosperity in the New American West*. Washington D.C.: Island Press. pp.1-185.
- Price-Waterhouse Coopers. 2001. *Economic study of the Los Alamos post fire residential real estate market*. Prepared for the Federal Emergency Management Agency by the Office of Cerro Grande Fire Claims. pp. 1-35.
- Rasker, R. and Hansen, A. 2000. Natural amenities and population growth in the greater Yellowstone region. *Human Ecology Review*. 7(2): 30-40.
- Reinhardt, E.D., Keane, R.E., Calkin, D.E. and Cohen, J.D. 2008. Objectives and Considerations for Wildland Fuel Treatment in the Interior Western United States. *Forest Ecology and Management*, 256(12): 1997-2006.
- Review Team. 2001. *Developing an Interagency, Landscape-scale, Fire Planning Analysis and Budget Tool*, Report to the National Fire Plan Coordinators: USDA Forest Service and USDI. Available at URL: <http://www.fpa.nifc.gov/Library/Memos/Docs/Hubbardrpt.pdf>, accessed 17 November 2006.
- Rosen, S. 1974. Hedonic prices and implicit markets: product differentiation in perfect competition. *The Journal of Political Economy*. 82(1): 34-55.
- Running, S. W. 2006. 'Is global warming causing more, larger wildfires?' *Science*, 313(5789): 927-928.
- Spring, D. A. and Kennedy, J. O. S. 2005. 'Existence value and optimal timber-wildlife management in a flammable multistand forest', *Ecological Economics*, 29(3): 365-379.
- Steelman, T.A., Burke, C.A. 2007. Is wildfire policy in the United States sustainable? *Journal of Forestry*. 105(2): 67-72.
- Stewart, C., Bita N. and Perkin, C. 2009. 'Life or lifestyle, warns fire chief', *The Australian – Hell and All its Fury: Black Saturday Bushfires Special*, 14 February, pp. 1 and 4.

- Swanson, L.D., Nickerson, N. and Lathrop, J. 2003. Gateway to Glacier: The Emerging Economy of Flathead County. Washington D.C.: National Parks Conservation Association. pp.1-36.
- Talberth, J., Berrens, R.P., McKee, M. and Jones, M. 2005. Averting and insurance decisions in the wildland-urban interface: Implications of survey and experimental data for wildfire risk reductions policy. *Contemporary Economic Policy*. 24(2): 203-223.
- Theobald, T.M. and Romme, W.H. 2007. Expansion of the US wildland-urban interface. *Landscape and Urban Planning*. 83(4): 340-354.
- US Census Bureau. c.2008. 2000 Census State and County Quickfacts. Available at URL: <http://quickfacts.census.gov/qfd/states/30000.html>, accessed January 17, 2008.
- USDA. c.2006a. US Forest Service Northern Region fire occurrence history - points, available at URL: http://www.fs.fed.us/r1/gis/thematic_data/fire_history_r1_1985_2004_pt.htm, accessed February 22, 2008.
- USDA. c.2006b. US Forest Service Northern Region fire occurrence history - polygons, available at: http://www.fs.fed.us/r1/gis/thematic_data/fire_history_r1_1985_2006_poly.htm, accessed February 22, 2008.
- USDA. c.2007b. Canopy Cover information from LANDFIRE project available at URL: <http://landfire.cr.usgs.gov/viewer/viewer.htm>, accessed January 13, 2008.
- USDA OIG (Office of Inspector General). 2006. Audit Report: Forest Service large Fire Suppression Costs. Report Number 08601-44-SF, USDA Office of Inspector General, Washington, D.C. Available at URL: <http://www.usda.gov/oig/webdocs/08601-44-SF.pdf>, accessed 24 April 2007.
- USDA, White House Council on Environmental Quality and USDI. 2002. Administrative actions to implement the President's healthy forests initiative, Fact Sheet S-0504.02, December 11, USDA, White House Council on Environmental Quality and USDI, Washington, D.C., available at URL: http://www.whitehouse.gov/ceq/hfi_usda-doi_fact_sheet_12-11-02.pdf, accessed 14 January 2008.
- USDA Forest Service, USDI Bureau of Land Management and National Association of State Foresters. 2003, Large fire cost reduction action plan. Available at www.fs.fed.us/fire/management/action_plan/cost_reduction.html, accessed 15 November 2006.
- USDI and USDA. 2000. Managing the impact of wildfires on communities and the environment, USDI and USDA, Washington, D.C., available at URL: <http://www.forestsandrangelands.gov/reports/archive.shtml>, accessed 14 January 2008.
- USDI and USDA. 2001. Urban-wildland interface communities within vicinity of federal lands that are at high risk from wildland fire. *Federal Register* 66(3): 751-777.
- USDI, USDA, Department of Energy, Department of Defense, Department of Commerce, U.S. Environmental Protection Agency, Federal Emergency Management Agency and National Association of State Foresters. 2001., *Review and Update of the 1995 Federal Wildland Fire Management Policy*, Bureau of land Management, Office of Fire and Aviation, Boise. Available at URL: http://www.nifc.gov/fire_policy/history/index.htm, accessed 15 November 2006.
- USDI, USDA, and NASF (United States Department of the Interior, United States Department of Agriculture and National Association of State Foresters). 2005. Quadrennial Fire and Fuels Review Report, National Advanced Fire and Resource Institute, Tucson.
- Venn, T.J. and Calkin, D.E. 2009. 'Challenges of socio-economically evaluating wildfire management on non-industrial private and public forestland in the western United States', *Small-scale Forestry*, 8(1): 43-61.

- Walker, S. H., Rideout, D. B., Loomis, J. B. and Reich, R. 2007. 'Comparing the value of fuel treatment options in northern Colorado's urban and wildland interface areas', *Forest Policy and Economics*, 9(6): 694-703.
- Westerling, A. L., Hidalgo, H. G., Cayan, D. R. and Swetnam, T. W. 2006. 'Warming and earlier Spring increases western U.S. forest wildfire activity', *Science*, 313(5789): 940-943.
- Western Governors' Association. 2001. A collaborative approach for reducing wildland fire risks to communities and the environment: 10-year comprehensive strategy, Western Governors' Association, Denver, available at URL: http://www.westgov.org/wga/initiatives/fire/final_fire_rpt.pdf, accessed 14 January 2008.
- Winter, G.J., and Fried, J.S. 2001. Estimating contingent values for protection from wildland fire using a two-stage decision framework. *Forest Science*. 47(3): 349-361.

ADOPTABILITY OF A COMPLEX AGRO-FORESTRY PROJECT FOR SMALLHOLDERS ON A PHILIPPINE ISLAND

Sonja Vilei¹

Abstract--The “Rainforestation Farming” (RF) project was developed in the Baybay area of The Philippines as a Philippine-German co-operation and is based on the use of indigenous trees in contrast to the predominant use of exotic timber trees in commercial tree planting. Twenty-five farmers, who had adopted the RF system between 1995 and 2000 on individual plots, were interviewed in two surveys in 2007 and 2008; data about the socio-economic conditions, management, and use of their trees were collected. These survey data are compared with the anticipated management and use as envisioned by the project developers. The comparisons showed that most farmers managed the plots less intensively than suggested by the project developers. Mostly, farmers did not carry out pruning and thinning, many had no intercrops in the first years, and many had no interplanted fruit trees. The inclusion of intercrops and fruit trees was emphasized to give farmers the opportunity to gain income from the plot before the timber can be harvested, in 25 or more years for several species. Farmers focused much less on the economic side of the project but were planting the trees for their own or their children’s use, whereby the maximum profitability was mostly not their concern.

The project developers had planned the project carefully so that resource-poor smallholders would be able to start RF and benefit economically. But the “typical” individual adopter was not the typical smallholder, being endowed with greater than average resources, either enough land or a more attractive off-farm employment.

The concept clearly has the potential to offer ecological benefits as well as economical ones, but in order to be widespread, considerable extension advice over the course of several decades would have to be offered, which is a time-consuming and costly procedure. Technology transfer did not take place over individual farmers, but over farmers associations only, and on a very low level. Current policy regulations, which make harvesting and marketing of indigenous timber trees a complicated procedure, are another obstacle for small-scale tree farmers. In its current complex form and without external financial assistance, RF is not an easily-adoptable concept for resource-poor smallholders.

INTRODUCTION

Between 1995 and 1996, 22 individual farmers and two farmers associations started planting indigenous trees in the area of Baybay, situated on the western site of the island of Leyte,

¹ Institute for Farm Management (410a), University of Hohenheim, Germany, Email: svilei@uni-hohenheim.de

Philippines. They followed the advice from an agro-forestry project called Rainforestation Farming (RF), which was developed in a Philippine-German co-operation. Focus was set on planting indigenous trees instead of exotic ones, aiming to create a farming system resembling as close as possible the natural ecosystem (Göltenboth and Hutter 2004). Thus, RF aimed at replacing the kaingin (shifting cultivation) system on former fallows and releasing pressure from primary and still close-to-natural secondary forests (Marohn 2007). The need of small-scale farmers to benefit economically from this system was acknowledged in the development by adding the interplanting of annual crops. A manual has been prepared for farmers, guiding them in the implementation of a Rainforestation Farm in an old coconut stand or on a degraded area and advising them which annual crops can be intercropped during the first years to provide income (Margraf and Milan 2006).

Implementation and monitoring of the project has been carried out by the GTZ (German agency for technical co-operation) and the Visayas State University (VSU, formerly Visayan College of Agriculture) during the first 10 years. Currently, farmers can still ask for advice at the VSU, but monitoring has ended. The Institute of Tropical Ecology (ITE) at the VSU carries out trainings with interested farmers associations and co-operatives in other areas of the Philippines, but the activity on Leyte itself is limited.

Several studies have been undertaken with regard to the Rainforestation Farming, mostly Bachelor or Master theses, but also some PhD projects. Out of these, few studies were concerned with the economics, adoptability, and management of the project. One reason for the few studies is the fact that not much data have been collected over the years regarding management and development of trees. Another reason lies in the still young age of the trees. Usually a cycle of 25 years is used for financial and economical calculations, a time span which will not be reached until 2020 for the first adopters. The few economical studies which have been carried out so far concluded that the system can be highly profitable, but that the investment costs and risks are very high compared to coconut farming, coconut-abaca intercropping, or shifting cultivation (see Dirksmeyer 2000, Ahrens *et al.* 2004 and Neuberger 2005). It seems that RF has only been taken up by few farmers afterwards and is better known outside of Leyte than among small-scale farmers on Leyte. Possible reasons for the low adoption rate by farmers are lack of ownership (seedlings were given for free and in many cases weeding was carried out by project workers) and low short-term rentability.

This study aims to take a closer look at the socio-economic profile of the RF adopters as well as the management of their plots. The investigation focuses on whether the mostly hypothetical economic calculations are likely to come true for the first individual adopters. The reasons for the very low adoption rates are also examined. For this purpose, results from interviews with RF farmers around Baybay are used, as well as other studies on this topic. The objective was to analyze if Rainforestation Farming is a feasible option for individual small-scale farmers, since this was the intention of the project development.

METHODS

There is no strict definition of Rainforestation Farming. The objective was the creation of a farming system resembling as close as possible the natural ecosystem. But each farmer adopted the system according to his own needs; consequently there as many different systems as there are adopters. Initially (in 1992), fast-growing exotic species, such as *Gmelina arborea*, and *Acacia*

mangium and other exotic species were part of the Rainforestation pattern. But since the exotic trees turned out to be less resistant to extreme climatic events (Kolb 2003) and more susceptible to numerous pests and diseases (Chokkalingam *et al.* 2006), focus shifted more and more towards native species, especially the high-value Dipterocarpaceae, dominant in the native forests of the Philippines (Margraf and Milan 1996, Schulte 2002). The concept was laid out as a multi-story agro-forestry system, where annual crops could be intercropped during the first years. Once the canopy closes only shade-tolerant crops can be planted, including some fruit trees and abaca (*Musa textilis* Nee), a fiber producing banana plant. For this study, the definition was based on the planting of several species of indigenous lumber trees in a considerable amount on one plot. Indigenous species include for example Bagalunga (*Melia dubia*), Antipolo (*Artocarpus blancoi*) or Narra (*Pterocarpus indicus*). Examples for *Dipterocarpaceae* are Dalingdingan (*Hopea foxworthyi*), White Lauan (*Shorea contorta*) or Yakal (*Shorea astylosa*).

The first task for this study was to identify all RF farmers on Leyte, having adopted the technology on their individual plots. From the original 22 farmers only 16 could be included in the survey. One stopped shortly after the beginning of the program: one farmer had no own land, but wanted to plant trees on rented land and the landlord did not agree, one told us he did not plant any trees, but is cultivating a farm area inside the VSU forest area. Five co-operators died recently, two farms are led by the wife now and were included for analysis, while the remaining two were not included since it was unclear who is taking care of the farm. One co-operator was not available during the time of the study. In addition to the 16 farmers from the original list, 9 farmers from the two farmers associations, which adopted the RF concept in 1996, have planted trees on their individual plots. Therefore, 25 farmers practicing RF individually were interviewed from January to March 2007 and 22 of these were included in a follow-up survey in February 2008. All RF farmers included in the survey are from the municipality of Baybay, where the VSU is also located. Outside of Baybay there are only three other individual co-operators in Leyte, located in the municipality of Ormoc, however, these individuals were not included in this study since the owners did not represent the typical small-scale farmer, but had larger landholdings instead.

As a comparison group, other farmers around Baybay were included in the survey. These farmers were chosen randomly from the barangays (smallest administrative district in the Philippines that often corresponds to a village or town district) in which the RF farmers were located. The list of farmers in these barangays was provided by the barangay captains. From this comparison group of 46 farmers, 32 had not planted any timber trees (half of them had planted fruit trees) while 14 farmers had planted exotic timber trees, such as *Gmelina arborea*, the dominant species, *Acacia mangium*, or Mahogany (*Swietenia macrophylla*). For the further analysis three groups were compared: the first group consisted of the Rainforestation farmers, the second group were farmers without timber trees (fruit trees were not counted), and the third group were farmers with exotic timber trees. RF farmers and farmers with exotic timber trees were both considered as tree farmers, having planted timber trees.

Land ownership

Security of land tenure can also play a role in adoption of agroforestry systems. In the Philippines, the land is classified into A&D Land (alienable and disposable land) and timberland. A&D land can be titled by the Department of Environment and Natural Resources. Most A&D land, titled or not, is “declared”, meaning that it is declared to the municipality for the calculation

and collection of taxes. Land with a slope of 18% or more is classified as timber land and cannot be privately owned. Timber land will also be called timber land if no trees are left. In such a case timber land can also be declared A&D land when the land has been used agriculturally for more than 20 years. Traditionally, land was perceived as being in the control of the established occupant rather than being available through legal rights bestowed by a superior authority. It is still accepted within the communities that somebody who has cleared a piece of land and planted something is considered the owner of that area.

Stewardships for utilisation of timber land areas are given within certain programmes, such as Community Based Forest Management (CBFM) or the older Integrated Social Forestry Program (ISFP). Under the ISFP, Certificates of Stewardship Contracts were issued for 25 years, renewable for another 25 years, to individuals and families for plots up to five hectares and farmers were obliged by contract to plant at least 20% of the area with trees (Groetschel *et al.* 2001). In 1995, the Community Based Forestry Management (CBFM) initiative was labelled the national strategy for sustainable development of forest resources. Participating communities are granted access to forest land resources under a tenurial agreement for 25 years, renewable for another 25 years.

RESULTS

Management and Economics of Rainforestation Farms

When starting the project, the project developers were aware that the typical small-scale farmer of the area has to acquire sufficient income from the plot before the trees are mature enough to be harvested, which can take 25 years or more. In the manual for farmers wishing to start a RF farm, farmers are instructed which plants they can use for intercropping during the years until lumber harvest (Margraf and Milan 2006). In the establishment phase, sun-loving root crops – such as sweet potato or pineapple – can be intercropped. Once trees have grown, only shade-tolerant crops can be planted, such as rattan, Abaca (to some extent) and Ube (a root crop, which climbs up the trees). But the productivity of crops and fruit trees will be reduced due to the shade of the trees. If farmers start a RF farm in an old coconut stand, there is no need for intercropping and coconuts can continue to be harvested. After several years the planted trees will start to shade out the coconuts, thereby decreasing the yield of copra.

The RF manual indicates that the first revenue from the RF farm will start in year 5 with firewood, while round timber, which might be used for products such as small tables, telephone stands or baby cribs, could be harvested starting in year 10. Economic calculations were based on the recommended management as well. After the first survey in 2007 it became apparent that most RF farmers did not follow such management instructions; therefore the RF farmers were interviewed once more in 2008 with a focus on management and the use of their RF plot. Table 1 reports on how the existing individual co-operators manage their plot, whether they intercrop and then with what, and whether they obtain income from it in year 13. To date, the great majority of the RF farmers had not received substantial income from the plot, and some did not even have intercrops, but were waiting for the lumber to be ready for harvest. While some trees, such as *Gmelina* or Mahogany, can be harvested after 10-12 years, the Dipterocarps and other indigenous high-value trees will take 25 years or more to reach harvestable size. Farmers were fully aware of this fact and many have the trees planted more for the benefit of their children than for their own profit.

Monitoring in the course of the Leyte Island Program has been carried out under the supervision of the Institute of Technology (ITE) at VSU and the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), recording income-costs sheets for individual RF adopters (ITE and GTZ 2006). Details of the 12 individual adopters are presented in Table 2. The situation is quite diverse for the different farmers. Some have not even regained their investment costs because they started the system on degraded, vacant plots, and did not yet receive any income from the plot. It is important to remember, however, that all respondents received the seedlings for free and many also received in-kind support as labor during setting up of the plantations.

Table 1. Management of and income from Rainforestation farming plots as reported by farmers (n=25)

	Survey results (2007, 2008) and secondary data from ITE and GTZ (2006)
Intercrops	3 farmers intercrop Abaca and receive income from it. The majority of the RF farms were established under old coconut stands and farmers continue harvesting coconuts. Other intercrops are yam and pineapple.
Firewood	14 adopters either sold firewood or used it for home consumption; 8 adopters did not use firewood from their RF plots, usually because their plot was located very far from their home.
Lumber	3 respondents sold lumber, 5 used it for house construction, 2 used round timber for own purposes, trees at 1 farm were cut for an electricity line, 16 did not harvest lumber yet. 12 farmers wanted to sell to a lumber dealer, 3 wanted to sell locally only, and 7 wanted lumber only for own needs or as legacy for their children.
Fruits	7 farmers harvested fruit from their RF plots; some had no fruit trees planted. 2 sold fruit for 5,000 PHP and 16,000 PHP (net) in 2007.
Has your income increased since starting RF?	To date, 13 respondents received no income from the plot. 5 reported earning more from the plot than before they started RF, because of: sale of fruit (1), sale of tree seedlings (1), Abaca intercropping (1), higher Abaca yield due to improved soil (1) and sale of lumber (1). 3 respondents reported earning less than before the start of RF, because large trees shaded out the coconuts and decreased copra yields. ²

100 PHP equal \$ 2.07 US on March 31, 2009

² Fritsche (2004) conducted a survey among 23 RF farmers in 2003 where 17 reported receiving higher income, averaging 4,600P. It is assumed that he focused on income from the plot in general, which would have been gotten without RF as well. It might also be that in the intermediate stage of the project, sun-loving crops cannot be planted any longer, but lumber is also not yet ready for harvest.

Table 2. Costs and income of individual RF farms for one hectare in PHP (based on farmers' records (until 2003, ITE and GTZ 2006, and own survey results)

No.	Plot use before	Investment costs		Years to positive cash flow		Total net income in 2007	
		Including seedlings	Excluding seedling	Including seedlings	Excluding seedlings	Including seedlings	Excluding seedling
1	Coconut	48,375	16,575	6	5	237,135	268,905
2	Coconut	111,330	29,295	8	2	142,083	224,118
3	Degraded	106,590	76,890	10	9	130,767	168,537
4	Coconut	42,021	21,411	7	4	19,401	40,011
5	Coconut	41,470	31,330	5	4	48,020	58,160
6	Coconut	56,845	32,785	13	10	21,740	45,800
7	Vacant	87,180	47,880	13	13	-68,612	-29,300
8	Coconut	26,360	11,720	4	2	117,068	131,628
9	Coconut	27,090	16,965	4	3	52,585	62,410
10	Cogon grass	51,440	21,740	13	13	-63,840	-34,140
11	Coconut	54,820	33,820	4	3	56,776	77,236
12	Cogon grass	433,444	30,188	13	13	-37,219	-20,013

Costs for seedlings were covered by the project, in the table costs and income are presented once including costs of the seedlings, once excluding costs of the seedlings.

Only few economical studies were carried out regarding the RF project so far (Dirksmeyer 2000, Ahrens *et al.* 2004 and Neuberger 2005). When comparing the Net Present value (NPV) of different farming systems, it could be seen that Rainforestation Farming has the potential to be very profitable, reaching the highest NPV among the compared land-use systems (Table 3). Calculations were modified from Ahrens *et al.* (2004), using actual prices. Ahrens *et al.* based their calculations on the management and harvesting pattern advised by the project developers. For comparison, the NPV of one of the well-managed RF farms, interviewed in the survey of this study, was calculated using the farm recordings until 2008 and estimating costs and income until 2020. The resulting NPV is much lower than the one Ahrens *et al.* had calculated and is lower than for an already existing, productive coconut farm. But the calculations for the coconut farm were carried out using a copra price of 20 PHP/kg, which was paid at the time of the survey. Since the copra price is dictated by the world market, it is highly variable. The comparison of the

two RF farms in Table 3 shows that the projected outcome was quite optimistic, but that the system can still be profitable (cash flow tables in appendices 1 to 5). Prices for high-value timber can also be expected to rise, since demand is high, while availability is low.

Table 3. Financial values of agroforestry systems (1 ha), on Leyte, the Philippines, based on a cycle of 25 years

Land-use system	Investment costs ⁵ (PHP)	NPV in PHP (discount rate)			BCR (discount rate 9%)	Years to positive cash flow
		6.5%	9%	15%		
RF based on kaingin ¹ farm (0.5ha kaingin ¹ , 0.5ha RF) ²	87,595	1,419,511	993,658	444,331	2.59	5
RF based on coconut farm ³	111,230	639,626	441,142	177,549	2.14	7
Coconut plantation old ⁴	-	381,495	312,835	215,757	2.34	-
Tree farming with <i>Acacia mangium</i> ²	35,366	242,251	165,022	67,417	1.82	6
Coconut plantation new ^{2,4}	54,825	127,738	77,924	16,410	1.53	11

BCR=Benefit Cost Ratio, NPV=Net Present Value, PHP=Philippine Peso; RF =Rainforestation Farming

1: shifting cultivation

2: modified after Ahrens *et al.* 2004

3: based on farmers' records until 2003, ITE and GTZ 2006, and own survey results

4: copra prices were calculated based on 20 PHP/kg

5: Investment costs were calculated up to the first year where positive cash flow was reached.

Cash-flow tables are given in the appendices 1-5.

100 PHP equal \$ 2.07 US on March 31, 2009.

Apart from the high investment costs, there are other problems related to the economic success of the RF. These are: lack of markets for high-value lumber and the complicated and bureaucratic procedure, which farmers have to undertake to harvest their trees. The RF is based on the use of high-value, indigenous trees. To prevent illegal logging, a logging ban was introduced in 1999 for indigenous species in the Philippines (Göltenboth and Hutter 2004). Farmers are required to register their trees with the Department of Environment and Natural Resources (DENR) to be allowed to harvest them and sell the lumber. While the logging ban was meant to protect the little that remains of the primary forest, it also seems to inhibit the planting of trees, especially of the high-value indigenous trees, by small-scale farmers (Harrison *et al.* 2007). The supply of this lumber is limited, but the demand by customers is still there, leading to an illegal market. In 2003, a survey by the VSU found that of the 19 furniture makers around Baybay 9 bought their lumber from illegally-operating chainsaw owners, while the remaining 10 did not indicate where they bought the lumber, presumably because the source was also illegal

(ITE and GTZ 2006). Results from this study in February 2008 were similar. The 5 respondents from the area of Baybay said they still received lumber from illegal sources since it was difficult to get high-value lumber otherwise. Farm-gate prices which can be received for commonly traded high-value lumber, such as i.e. Narra (*Pterocarpus indicus*), White Lauan (*Shorea contorta*) or Yakal (*Shorea astylosa*) average around 40 PHP per board foot (bdft). Farm-gate prices paid for Gmelina ranged from 11 to 15 PHP/bdft with a market sale price averaging around 25.³

Adoptability of Rainforestation Farming

When discussing economic and ecological benefits of an agroforestry system such as Rainforestation Farming, it has to be evaluated if farmers are actually adopting the system outside of the project. Some household characteristics proxies are often used for adoptability studies (Pattanayak *et al.* 2003) and were collected here (Table 4).

RF and other tree farmers had a higher percentage of upland cultivated and both groups had significantly higher slope than farmers without timber trees. Flat land is usually used for rice farming, while agro-forestry might be done on land which cannot so easily be used for annual crops.

Table 4. Comparison of household characteristics of Rainforestation farmers and other farmers around Baybay, Leyte, Philippines

	Rainforestation farms (n=25)	Farms without timber trees (n=32)	Farms with exotic timber trees (n=14)
Age male	58.30	55.61	53.92
Education adults ¹	2.64 ^A	2.25 ^B	2.46 ^{AB}
Education children ²	2.45 ^a	1.75 ^b	1.75 ^{ab}
Land tenure (% of respondents who own majority of their farm land)	92.0 ^A	34.4 ^B	50.0 ^B
Farm land owned (%)	83.02 ^a	31.0 ^b	47.62 ^b
Farm size per capita (ha)	1.53 ^a	0.40 ^b	0.51 ^b
Percentage upland cultivated	63.36 ^{ab}	41.77 ^a	75.71 ^b
Slope of land cultivated ³	3.25 ^a	3.50 ^b	3.17 ^a
Membership in organization (%)	72.0 ^A	40.6 ^B	71.4 ^A

Means with the same letter within rows are not significantly different ($p < 0.05$ for small letters or $p < 0.1$ for capital letters) according to Tukey's HSD Test or Chi-square (if no letters are used, there are no significant differences)

1: from 1=illiterate to 4=college

2: from 1=no grown-up child at college to 4=all grown-up children at college

3: 1=very steep, 2=steep, 3=gently sloping, 4=flat

100 PHP equal \$ 2.07 US on March 31, 2009

³ Prices are based on ITE and GTZ (2006), on survey data (2008) and 2006 data received from the ACIAR office, located at the Department for Forestry at VSU, in February 2008.

Farmers adopting the RF, and their children, are on average better educated than other Baybay farmers not planting timber trees. The great majority (92%) of RF adopters are land owners, but only 34.4% and 50% of other Baybay farmers own land. The RF farmers had significantly larger landholdings, averaging 4.48 ha, than other farmers in Baybay (1.22 and 1.64 ha). The average landholding of farmers in Region 8, where Leyte is located, is 2.19 ha, according to the census of the National Statistics Office in 2002 while it is 2 ha for the whole of the Philippines. A closer look at the type of land ownership in Table 5 reveals that most of the RF farmers had land titles, while farmers without trees often had no formal document to prove their ownership.

Table 5. Type of land ownership of Rainforestation farmers and other farmers around Baybay, Leyte, Philippines

Type of ownership	Rainforestation farms (n=25)	Farms without timber trees (n=32)	Farms with exotic timber trees (n=14)
None	4	59.4	36.6
Titled	64	18.8	35.2
Tax declared	28	15.6	22.5
No formal document	-	6.3	4.2
Stewardship certificate	4	-	1.4

Overall, the results seem to support the argument that farmers need a high degree of security, which is offered by the ownership of the land and larger landholdings, to invest in agroforestry (Mercer 2004). Reasons for not planting trees, stated by other Baybay farmers, were either a) not enough land area available (n=11) or b) not my own land (n=10). Baynes (2007) reports about a forestry extension program with 22 farmers in Southern Leyte, the Philippines, where the participants had relatively large landholdings and other income sources available, owned land which was unproductive, and therefore showed interest in planting trees. Similar results were reported by Emtage and Suh (2004) from a survey of 203 households in Leyte, Philippines, indicating that households who were planning to plant trees had higher resources.

To further investigate if the RF system is likely to spread, the current study made an attempt to identify all individual RF Farmers around Baybay, where all early adopters were located. Outside of Baybay there are only three co-operators in the municipality of Ormoc and two in Biliran province, who started a few years ago. Another study determined that the RF technology, applied by individual farmers, had not transferred to neighbors or friends (Velarde 2007). The two farmers associations transferred the technology to their members; nine could be identified and were included in the survey. Some members pointed out others to us, but these had only planted one lumber tree species at the side of their fields or only planted some fruit trees or exotic timber trees, such as *Gmelina arborea* or *Acacia mangium*; these farmers were consequently not included as RF farmers.

While the concept has not been widely adopted by small-scale farmers, it is spread by Haribon, a Philippine environmental organization, through their reforestation projects. Several private companies, i.e. Del Monte, have also reforested large areas on other islands of the Philippines following the RF concept. And the DENR had an official decree in 2004, stating that they will use the RF concept for their reforestation activities.

DISCUSSION AND CONCLUSIONS

The economic calculations show that Rainforestation Farming can be profitable for farmers, but the farmers need to have other resources to rely on for the investment costs, and while they wait 20 years or longer for their profit. Comparisons of the RF and other farmers indicated that the RF adopters did not represent the typical small-scale farmer, having significantly larger landholdings and being mostly owners of their land. Most of the farmers had generated very little or no income from their Rainforestation Farming plot. It seems that the intermediate years on this system have the lowest opportunities for income, since harvest of lumber does not really start, but intercropping is more challenging. It has to be taken into account, that the early RF adopters obtained their seedlings for free from the project; some even got their trees planted, and were themselves responsible only for the following maintenance. One of the later adopters, belonging to a RF farmers association, reported that he paid for his seedlings, and the other later adopters collected the seeds themselves, having acquired the necessary knowledge.

Several of the surveyed smallholders were growing timber trees, but the exotic ones, predominantly Gmelina. Despite regarding Gmelina timber as having a low value and believing that the tree is prone to typhoon damage, Gmelina continues being one of the farmers' favorites, even among the RF farmers. Several reasons for this can be suggested: Gmelina seedlings are readily available, the tree can be harvested in as few as 10-12 years, it has a certain, though low, market value, and the legal procedure to harvest the trees is less strict. The indigenous timber is highly valued, but has a longer rotation, is more demanding in its cultivation, and marketing is difficult.

Rainforestation Farming as a concept aimed at small-scale farmers remains a pilot project. It seems unlikely that farmers, having little other income sources, will adopt it in great numbers. Since the system was only spread through the farmers associations and not by individuals, the Institute of Tropical Ecology at the VSU consequently promotes RF through training of farmers associations. Bertomeu (2005, pp. 8-9) recommends in his financial analysis that farmers could profit most if they gradually plant tree hedgerows, or rotational timber fallows; it "is more acceptable to farmers (i.e. more profitable and feasible [and] less risky [...]) because it provides higher returns to land and reduces the risk of agroforestry adoption by spreading over the years labor and capital investment costs and the economic benefits accruing to farmers from trees".

Continuing the advising activities to the farmers seems crucial for the success of Rainforestation Farming. If individual farmers would be given additional land, they might be willing to start with RF, but it is unlikely that they convert their farm if they have little or no other means for securing their livelihood.

ACKNOWLEDGEMENTS

This study was supported by a grant from the Landesgraduiertenförderung Baden-Württemberg, and for the field phases in the Philippines by the German Academic Exchange Service DAAD and the Father and Son Eiselen Foundation Ulm. My thank goes to the anonymous referees for advice regarding the improvement of this paper.

REFERENCES

- Ahrens O, Henders S, Langkau M, Lindemann S, Müller T and M Petri (2004). Cost-Benefit Analysis – Comparison of different land uses in Leyte, Philippines. Report, Faculty of Forest Sciences and Wood Ecology, Georg-August-University, Göttingen, Germany
- Baynes J (2007). Evaluating the Effectiveness of a Small-scale Forest Extension Program on Leyte Island, the Philippines. In Harrison S, A Bosch and J Herbohn (eds): *Improving the Triple Bottom Line: Returns from Small-Scale Forestry, Proceedings of the IUFRO 3.08 Conference, Ormoc City, Leyte, the Philippines, June 17-21 2007*
- Bertomeu M (2005). Small-scale farm forestry: an adoptable option for smallholder farmers in the Philippines? 2nd National Agroforestry Congress: *International Consultation Workshop on Smallholder Agroforestry Options for Degraded Soils (SAFODS)*. World Agroforestry Centre – ICRAF, SEA Regional Office, Malang, Indonesia
- Chokkalingam U, AP Carandang, JM Pulhin, RD Lasco, RJJ Peras, T Toma (editors, 2006). One century of forest rehabilitation in the Philippines – Approaches, outcomes and lessons. CIFOR, Bogor Indonesia. URL: http://www.cifor.cgiar.org/publications/pdf_files/books/BChokkalingam0601.pdf
- Dirksmeyer W (2000). Environmental economics of Rainforestation Farming. *Horticultural Systems in the tropics, Working Papers Series 3*, Institute of Horticultural Economics, University of Hannover, Germany
- Emtage N and J Suh (2004). Socio-Economic Factors Affecting Smallholder Tree Planting and Management Intentions in Leyte Province, Philippines. *Small-scale Forest Economics, Management and Policy*, 3(2):257-271
- Fritsche MA (2004). Die wirtschaftliche Bedeutung des „Rainforestation Farming“-Konzepts für Schwellenländer in den Tropen am Beispiel der Philippinen, University of Hohenheim, Stuttgart, Germany
- Göltenboth F and CP Hutter (2004). New options for land rehabilitation and landscape ecology in Southeast Asia by “Rainforestation farming”. *Journal for Nature Conservation* 12:181-189
- Groetschel A, RR Aquino, I Buchholz, TG Eufrazio-Mazo, A Ibkendanz, NA Sales, J Seven and KC Vicentuan (2001). Natural Resource Management Strategies on Leyte Island, Philippines. Publication Series by the Centre for Advanced Training in Rural Development, Berlin.
- Harrison S, E Mangaoang, J Herbohn and E Nasayo (2007). Reforming Tree Regulation and Associated Policies in Leyte, the Philippines. In Harrison S, A Bosch and J Herbohn (eds): *Improving the Triple Bottom Line: Returns from Small-Scale Forestry, Proceedings of the IUFRO 3.08 Conference, Ormoc City, Leyte, the Philippines, June 17-21 2007*
- Harrison S, RT Venn, RF Sales, EO Mangaoang and JL Herbohn (2004). Estimated Financial Performance of Exotic and Indigenous Tree Species in Smallholder Plantations in Leyte Province. Published in Baumgartner D. M., editor. *Human Dimensions of Family and Farm Forestry, Proceedings of International Symposium, March 29 – April 1*. Washington State University, Pullman, USA
- ITE and GTZ (2006). Evaluation of Silvicultural Management, Ecological changes and Market Study of Products of Existing Rainforestation Demo and Cooperators’ Farms, Terminal report, Leyte State University, Institute for Tropical Ecology pp. 97

- Kolb M (2003). Silvicultural analysis of rainforestation farming areas on Leyte Island, Philippines. Magister Thesis, University of Göttingen, Germany
- Margraf J and PP Milan (2006). Rainforestation Farming – a farmer’s guide to biodiversity management for the Philippines (revised edition 2006). Haribon Foundation, Philippines
- Marohn C (2007). Rainforestation farming on Leyte island, Philippines – aspects of soil fertility and carbon sequestration potential. Dissertation, University of Hohenheim, Faculty of Agricultural Sciences, Germany, pp.234
- Mercer DE (2004). Adoption of agroforestry innovations in the tropics: A review. *Agroforestry Systems* 61-62(1-3):311-328
- Neuberger A (2005). Rainforestation Farming- Geo-economical and landscape relevant aspects of the Philippine approach for subsistence and ecosystem improvement. Master thesis, University of Tübingen, Faculty for Geo sciences, Tübingen, Germany: pp 307
- Pattanayak SK, DE Mercer, E Sills and JC Yang (2003). Taking stock of agroforestry adoption studies. *Agroforestry Systems* 57(3):173-186
- Schulte A (2002). Rainforestation Farming: Option for rural development and biodiversity conservation in the humid tropics of Southeast Asia. Shaker Verlag, Aachen, Germany
- Velarde GL (2007). Dissemination and Adoption of Rainforestation Farming: Some Cases in Leyte. Bachelor Thesis, Leyte State University, Philippines

Appendix 1: Cash flow table of Rainforestation farming based on kaingin1 farm (0,5 ha kaingin, 0,5 ha RF), modified after Ahrens *et al.* 2004

Year	Activities	Cost (PHP)	Benefits (PHP)	Cash flow (PHP)
0	Seedlings, land preparation ²	23,492	0	-23.492
1	Seedlings, weeding	95,534	47,033	-48.501
2	Seedlings, maintenance	76,381	60,779	-15.602
3	Seedlings, maintenance	49,885	63,466	13.581
Ø 4-12	Maintenance	41,207	78,032	36,823
13	Harvesting, maintenance	274,728	1,998,104	1,723,376
Ø 14-24	Maintenance (Harvesting)	53,319	181,101	127,782
25	Final harvest	132,122	672,979	540,857
SUM		1,609,532	5,536,749	3,927,226
Discount rate		6.5%	9%	15%
NPV		1,419,511	993,658	444,331
Benefit-Cost-Ratio		2.83	2.59	2.07

1: shifting cultivation

2: includes brushing, lay-outing, staking, hauling, digging and planting

Appendix 2: Cash flow table of Rainforestation farming based on coconut farm (1 ha), based on farmers' records until 2003, ITE and GTZ 2006, and own survey results

Year	Activities	Cost (PHP)	Benefits (PHP)	Cash flow (PHP)
0	Seedlings, land preparation ¹	132,905	21,675	-11,230
1	Maintenance, harvesting	3,000	20,898	17,898
Ø 2-12	Maintenance, harvesting	6,110	18,529	12,419
13	Harvesting	274,593	1,362,752	1,088,159
Ø 14-24	Maintenance	53,304	84,644	31,340
25	Final harvest	132,122	426,094	293,972
SUM		1,196,178	2,966,316	1,770,138
Discount rate		6.5%	9%	15%
NPV		639,626	441,142	177,549
Benefit-Cost-Ratio		2.28	2.14	1.71

1: includes brushing, lay-outing, staking, hauling, digging and planting

Appendix 3: Cash flow table of existing coconut plantation (1 ha) modified after Ahrens *et al.* 2004

Year	Activities	Cost (PHP)	Benefits (PHP)	Cash flow (PHP)
Ø 0-25	Harvesting, maintenance	21,638	50,544	28,906
SUM		562,593	1,314,144	751,551
Discount rate		6.5%	9%	15%
NPV		381,495	312,835	215,757
Benefit-Cost-Ratio		2.34	2.34	2.34

Copra price used was 20 PHP/kg

Appendix 4: Cash flow table of *Acacia mangium* plantation (1 ha) based on Ahrens *et al.* 2004

Year	Activities	Cost (PHP)	Benefits (PHP)	Cash flow (PHP)
0	Seedling production, land preparation ¹ , fertilization	23,517	0	-23,517
1	Pest control, fertilization, weeding	7,908	0	-7,908
Ø 2-5	Maintenance	985	0	-985
6	Harvesting	66,157	132,259	66,102
Ø 7-11	Maintenance	689	0	-689
12	Harvesting	218,916	553,835	334,918
13	Seedlings, land preparation, fertilization	18,186	0	-18,816
14	Pest control, fertilization, weeding	7,908	0	-7,908
Ø 15-18	Maintenance	985	0	-985
19	Harvesting	66,157	132,259	66,102
Ø 20-24	Maintenance	689	0	-689
25	Final harvest	218,916	553,835	334,918
Discount rate		6.5%	9%	15%
NPV		242,251	165,022	67,417
Benefit-Cost-Ratio		1.92	1.82	1,56

1: including burning, digging, planting

Appendix 5: Cash flow table of new coconut plantation (1 ha) modified after Ahrens *et al.* 2004

Year	Activities	Cost (PHP)	Benefits (PHP)	Cash flow (PHP)
0	Land preparation, seedlings, fertilizer, weeding ¹	15,975	0	-15,975
Ø1-6	Weeding, fertilizer	6,475	0	-6,475
7	Harvesting, maintenance	10,266	12,636	2,370
8	Harvesting, maintenance	14,057	25,272	11,215
9	Harvesting, maintenance	16,584	33,696	17,112
10	Harvesting, maintenance	19,111	42,120	23,009
Ø11-25	Harvesting, maintenance	21,638	50,544	28,906
SUM		439,415	871,884	432,468
Discount rate		6.5%	9%	15%
NPV		127,738	77,924	16,410
Benefit-Cost-Ratio		1.67	1.53	1.18

1: includes clearing the area, layouting and digging, hauling and planting.
Copra price used was 20 PHP/kg

BIO-ENERGY FROM PRIVATE FOREST SECTOR AND ITS IMPORTANCE IN LATVIA

Lelde Vilkrīste⁴

Abstract--Collection of fuelwood is one of dominant activities in the private forest sector in Latvia. Forest as a source of fuelwood is in the top in the valuation of forest services by private forest owners. Opinion polls of landowners show that it is also a very important reason for owning a forest. Private forest owners' knowledge about different sources of bio-energy from their forests and bioenergy market was tested in opinion polls. Results of the study show that fuelwood collection frequently is not based on sustainable management principles and is very close to conflict with legislation requirements. Dead wood is a more prevalent source than are harvesting residues; the concept of "clean forest" is a vital issue in the private forest sector. Harvesting and potential amounts of fuelwood in private forests, its consumption in household sector and supply to the market are discussed from view point of state policy implementation in the forest and energy sectors. The paper also addresses why calculations of fuelwood use based on statistical data, owners' interviews, and theoretical approaches are inconsistent. Considering that fuelwood collection is related to the welfare of forest owners, there is a great need to increase the knowledge and understanding of these issues.

INTRODUCTION

"Green gold of Latvia", "national treasure", "pillar of national economy", "guarantee of welfare" – these are only a few monikers for forest resources in Latvia. Data of State Forest Service (SFS) indicate that forest coverage in Latvia reached 50.4 % in 2008. Forestry is one of few profitable sectors in the national economy. Contribution of forest sector to GDP is up to 5 %. There are about 50,000 employees in forest and forest-related sectors; seasonally, this number increases to 80,000. Export of forest products in the last 10 years had increased more than twice, in 2007 it was 1.02 billion lats or 22.4 % of total export value in Latvia (Forest sector in Latvia 2008, 2009) The activities in the forest sector in Latvia is decreasing after global economic crisis of 2008, but forests as renewable resources will keep their role in the development of the national economy.

Several state strategies and political documents prescribe role of private forests and its importance for energy sector. For example, according to the goals defined by Forest Policy, the development of the private forest sector is an essential condition for overall development of the national economy and the preservation and maintenance of natural resources. The National Energy Strategy of Latvia proposed to increase the share of renewable energy resources in the national primary energy balance. Ensuring sustainable development of the national economy in the future and implementation of Forest Policy goals are not possible without improving management in private forest sectors.

⁴ Latvia Forest Research Institute "Silava", Rīgas iela 111, Salaspils, Salaspils nov. Rīgas raj., LV-2169, Latvia

After regaining independence in 1990, forests in Latvia were given back to previous owners or their inheritors. Privatization process of forest was complicated. In 1935 state has 1390,2 thousand ha of forest land, but private forest owners – 303,4 thousand hectares (Agriculture Ministry of Latvia, 2004). In fifty five years total forest area in Latvia increased by 64 %. State forest area had increased 1.2 times, but private forest sector more than 3.4 times (State Forest Service, 2004). Approximately 75 % of current private forests was formed on agricultural lands without management. Firstly, in 1990 all owners and their inheritors could ask back their lands what they had before 1940. Other forest land and not reclaimed forest land by previous owners was open for everybody for privatization. There were special rules how to apply for forest property and how to obtain it by vouchers. After regaining independence state allocated privatization vouchers for every Latvia citizen. Amount of vouchers depends from age and number of years worked in the state. These vouchers were used to buy land, dwellings or shares in companies. It was also market for these vouchers. It is important to mention that price for small farms was not high in vouchers. As price for vouchers in market also was comparatively small everybody try to use them in obtaining some land, also forest land close to his/her property.

Today close to 41 % of total forest are managed by 145,505 private forest owners (PFO). State Land Service of Latvia (SLS) compiles information about 167,869 private forest holdings with total area of 1,191,692 ha (36.5 % from total forest area) in 2007. Average forest holding area per owner doesn't exceed 7.1 ha (Vilkriste, 2008).

In last three years number of PFO increased by 3 %, but total forest area decreased by 2,6 %. Comparison of the data from 2004 and 2007 shows changes in the PFO ownership structure. In the 3-year period, about 10 % of PFO have left their owner status, but the number of new owners has increased by 27 %. Last research on PFO from 2007 provides the following information:

- gender aspects: male PFO – 54 %, female PFO– 46 %;
- average age of PFO – 54 years (female – 56 years, male – 52 years);
- 73 % of PFO live in the region where forest property is situated;
- proportion of urban forest owners is about 15 to 20 %.

In the last couple of years harvesting volume in Latvia is up to 11 million m³. The role of forest landowners in the timber market increases day by day. Supply of timber from the private forest sector will be needed also in future, and it is important that the private forests are under sustainable and effective management. Forest management provides not only qualitative resources in the future, but at the same time it provides welfare for PFO.

Several opinion polls of PFO were carried out in the last ten years. The purpose of these studies was to gather information on PFO motivation, needs, wishes, problems and future plans. Opinion polls provide information about the social portrait of PFO, forest management activities, knowledge about different forest issues, and attitudes towards different information and extension channels.

MATERIALS AND METHODS

First, it is necessary to explain the terminology used in the paper. Firewood is a special assortment obtained from the logging process. This term is usually used by forest experts. PFO for heating use firewood and other materials collected in forest, for example, residues of harvesting or dead wood or fallen trees. Also in this situation term of firewood (not fuelwood) is used in literature. Inconsequence arises after using data of Central Statistical Bureau of Latvia CSB. Some years ago fuelwood and firewood were synonyms, but with increasing years statistics become more precise and concept fuelwood include several components – firewood, wood chips, wood waste, charcoals and pellets.

Literature searches are used to study different research papers, legislative and political documents. Data on private forest sector and energy balance were obtained from different data bases of SFS, SLS and CSB for the study needs. The PFO and their holdings were classified based on the following features:

- size of the forest holding;
- age of PFO;
- sex of PFO;
- the place of residence of PFO;
- distance from residence place to the forest holding.

Methodology of opinion polls of PFO in Latvia has been designed by author in 2001 (Vilkriste, 2002). Data of opinion polls provide information about 80 % of PFO of Latvia who lives in country side or region where forest property is situated (urban forest owners were not included). Results of opinion poll describe social portrait and motivation of “average” forest owner in Latvia and formed base for development of extension service in the state. The sample of PFO was taken from data base of SLS according to a single criterion – the area of forest holding. Choice of respondents was based on the multiphase random selection method:

- first layer – selection of regions;
- second layer – selections of districts (stratum) in regions;
- random selection of respondents in each stratum.

Opinion polls in 2001 and 2003 included interviews also with an active PFO group. Respondents of an active PFO group were visitors of SFS during that time period when opinion polls were carried out. This group was named as “active PFO” due to fact that it was their own initiative to visit specialists of SFS for advice. Opinion polls of PFO were based on the null hypothesis that the characteristics, targets and motivation in forest management of active and average PFO were the same. The general goal of the study was to obtain objective information about overall situations in the private forest sector and the factors influencing forest management of PFOs. The surveys were carried out with the help of personal interviews and a questionnaire.

The paper is based on several opinion polls conducted by author. Each opinion poll includes “standard questions” and special or actual questions marketable by different forest experts. Use of fuelwood becomes an actual topic only in last four years in Latvia. This is reason why spectrum of data from several studies differs. Also different questionnaire were used for active forest owners. Other opinion poll of PFO based on relatively closed methodology to author was done by company “Latvia Facts” in 2003. This research was ordered by Forest Department of Agriculture Ministry of Latvia. Target of this opinion poll was to improve public image of forest sector and got additional information on studies done by author. Due to facts that opinion poll of “Latvia Facts” is presentable and methods are similar with author, these results were described together with findings of author. Table 1 represents year and number of respondents in each activity.

Table 1. Opinion polls of private forest owners in Latvia

Opinion poll	Year	Number of respondents
Personal interviews with PFO	2001	264
	2003	420
	2006	70
	2007	162
	2008	364
Interviews with active PFO in forestry of SFS	2001	2000
	2003	1260
“Latvia Facts” opinion poll	2003	1035

RESULTS OF OPINION POLLS

Motivation for being an owner

Majority or 64 % of PFO stated that the primary reason for becoming a forest owner was inheritance or a necessity to use privatization vouchers in 2003. Twenty percent of owners indicated that collection of firewood was an economic motivation for obtaining forest property.

PFO were asked to mention three factors why they decided to become forest owner. Most of PFO couldn't give answer to this question. They presented way of obtaining property as first reason for being forest owners in 2007, for example, I inherited it, I got it together with farm; no other use for vouchers; it was offered to me; everybody took forest and I also. Only 2 respondents could point out more than two reasons. Opinion poll of 2008 showed that economic motivation of PFO is decreasing. Economic motivation was mentioned only in 10.4 % of answers and in 95 % of them, it was collection of fuelwood. Answers to question what forest gives to your family were distributed as follows:

- forest is the main source of income – 1.1 %;
- forest provides an additional income – 48.1%;
- there is no income at present, but it will be in future – 28.0 %;
- no economic benefits at present and in future – 20.9 %.

Valuation of different forest functions and services show that firewood nevertheless is very important issue for PFO. Table 2 shows value of fuelwood is second in the appraisal system of PFO in 2008, but it is first for direct or economic use of forest. Also in 2001 and 2003 fuelwood collection was highest from direct use values. Forest as a source of income is less important than source of fuelwood also for active PFO.

Table 2 Valuation of different forest functions and services by PFO

	2001	2003	2003*	2008
Source of income	1.7	2.5	3.5	2.4
<i>Fuelwood</i>	3.7	3.7	4.1	4.0
Nonwood forest products	2.0	2.0	2.7	2.9
Recreation	2.0	2.4	3.1	2.7
Nature protection	3.0	3.4	3.7	3.6
Investment, safety	2.2	3.4	3.9	3.8
Inheritance for next generation	4.1	3.9	4.3	4.6
Self-confidence	4.2	3.6	3.6	3.7

* group of active PFO

Collection of fuelwood

In 2001, 65 % of the respondents in this study indicated that they collected fuelwood in the last 2 years. Three years later, this number had increased to 80 %. “Latvian Facts” in 2003 reported that 47,7 % of PFO used rights provided by Forest Law to collect up to 10 m³ dry or fallen trees from their properties without a cutting license. In 2007 and 2008 firewood collection was indicated by 77 % of PFO. Several owners pointed out obstacles to firewood collection by poor infrastructure or the presence of wetlands.

Respondents were asked to describe the origin of the firewood. Only 6 of the respondents indicated sources other than forest – materials from buildings under demolition, different remains of construction materials, and old furniture. Main sources of firewood for PFOs were:

- standing dead or dry trees – 43.7 %;
- harvesting residues – 21.7 %;
- dead wood – 9.1 %;
- wind-fallen trees – 8.2 %;
- old trees – 4.1 %;
- bushes – 4.1 %.

Use of fuelwood

“Latvian Facts” in 2003 reported that 85 % of PFO and forest sector employees use wood for heating. Opinion poll of PFO in 2008 shows that 91 % of forest owners have wood-based heating system, and on average each holding needs close to 20 m³ firewood per year. More than half, or 66.2%, of the PFO obtained the necessary amount of firewood from their own forest property, but 17.9 % had to buy part or the whole amount.

Both in 2003 and 2007 only 11 % of PFO obtained income from selling firewood. Fuelwood collection was done mostly for their own needs. Average volume of collected firewood per forest holding was 26 m³ in 2003. PFO who use it only for their own needs collected 21 m³, but in firewood-seller group, the average amount collected reached 57 m³. Only five owners indicated collecting more than 150 m³. In 2007, the average volume of firewood acquired from property reached 29.5 m³ per year, while one year later, it was 22.8 m³. PFO who used firewood only for themselves indicated collecting 19.5 m³.

Knowledge of environmental protection

In 2003 more than 85 % of PFO declared they had knowledge on environmental-protection issues. PFO were asked to mention three issues related to this topic. This simple test and discussions with respondents shown that totally only 34 % of PFO could name at least one aspect related to requirements of environmental-protection. Ecologically important trees, dead wood and biotopes were mentioned in only 20 % of answers, while legislation requirements of forest management were mentioned in 20 % of answers. In 2008, about 40 % of PFO declared their knowledge on environmental protection issues, but in fact only 17 % of PFO came up with correct answers. Even though level of knowledge decreased, perception of different requirements in nature protection had increased. Increasingly, the PFOs responded that it is possible to find all information from forest rangers.

Knowledge of biofuels market

In 2007, approximately 28 % of PFOs considered future income from selling biofuels. PFOs have the resources, so the need is only for buyers and attractive prices. Sixty-six % of PFOs gave a negative answer, justifying it with small forest holdings and potential volumes, and own need for firewood. One third of PFOs had some knowledge about a biofuels market in their municipality.

In 2008, about 21 % of PFOs considered that it was profitable to sell biofuels, but 46 % of PFOs had an opposite opinion. Only 25% of PFOs were optimistic to get income from selling biofuel in future. Overall, about 20 % of PFOs had at least minimal understanding of biofuel, but 33 % of PFOs did not have any idea about it.

FUELWOOD CONSUMPTION

Total energy consumption in the household sector is relatively stable (CSB,2008). Average amount of consumption of fuelwood in the household sector is up to 63,180 terajoules in 1990, and in last 8 years, annual changes did not exceed 5 %. Figure 1 shows the stability of distribution of sources of energy. Share of fuelwood did not change substantially in the last few years and it was close to 50 % of total energy consumption of a household.

The structure of energy consumption in the household sector has changed for the first time in 2001, when peat and its products disappeared. Second change occurred in 2005 with onset of relatively large use of charcoal. Today's statistics provide information about the use of wood wastes, wood briquettes, and pellets in the household sector (Table 3). In 2006 and 2007, other wood products made up 5 and 4 % of total energy consumption, respectively.

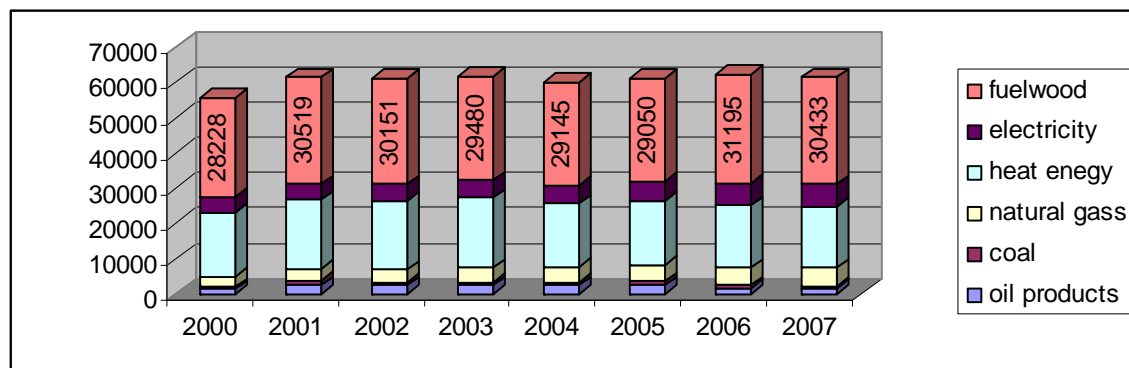


Figure 1. Energy consumption in the household sector (in terajoules)

Table 3. Use of fuelwood in the household sector

Type	Unit	2005	2006	2007
Fuelwood	thousand m ³	4787	4637	4521
Firewood	thousand m ³	4188	4177	4187
Wood briquettes	thousand tons	11	11	11
Wood pellets	thousand tons	2	2	2
Wood residues	thousand m ³	1452	1103	788

In the last four years, the annual use of firewood in the household sector went beyond $4,2 \times 10^5$ m³. The largest use of firewood in the household sector was registered in 2001 at 4,550 thousand m³. It is important to point out that the household sector uses major part of fuelwood from total energy consumption in Latvia. In 1995, the proportion of total fuelwood use in the household sector was 80 %, from 2000 - 2003, it was approximately 75 %, but in 2005, it was close to 82 % for final consumption of firewood or 62 % of total fuelwood consumption.

Energy consumption in the household sector was researched in 2001 by CSB. Number of dwellings using heating, water heating, and cooking equipment fired by fuelwood was determined to be:

- 49,445 central heating boilers (80 % firewood-based);
- 28,896 hot water boilers (76 % firewood-based);
- 16,693 combined boilers (76 % firewood-based);
- 345,724 room stoves (75 % firewood-based);
- 10,927 economic stoves (44 % firewood-based);
- 327,608 kitchen ovens (72 % firewood-based).

Totally in country about 60 % of dwellings with individual central heating system used fuelwood (47 % - firewood), more than 68 % of dwellings also used fuelwood in cooking equipments (38 % firewood), and close to 100 % stoves were based on fuelwood. It is interesting to note that, in

2001, half of total household energy costs per capita were for firewood. Total energy costs per capita on average were 86.80 lats, of that 22 % was for chip briquettes, 18 % for fuelwood, and 10 % for wood waste.

Total number of dwellings where fuelwood was used in 2001 reached 328,372. In most cases fuelwood was purchased. The proportion of purchased firewood has not changed in the last 5 years, but the number of self-prepared firewood in owners' forests has increased more than 1.5 times (Table 4). Also, obtaining of wood wastes indicates that individuals become more active in preparing firewood by themselves.

Table 4 Ways of obtaining fuelwood (% of dwellings)

Source	Way	1996	2001	2006
firewood	1. bought	54,1	66,4	62,0
	2. own	24,3	17,2	27,8
	3. mixed (1+2)	15,3	10,7	8,8
	4. free	6,3	5,2	1,4
wood residues	1. bought		84,5	76,7
	2. own		6,7	17,0
	3. mixed (1+2)		4,7	3,1
	4. free		4,1	3,2

DISCUSSION

Consumption and collection of firewood

Examination of sources and simple calculations show that information about collection and use of fuelwood in the household sector is inconsistent. There is no significant difference between data of CSB and opinion polls on how many individuals collected firewood by themselves. Great difference is found in the amount of collected firewood. Average energy consumption per dwelling by data of CSB is up to 10.5 m³, opinion polls show that PFOs need >19 m³ per year, but average collection of firewood reached 22 m³ per property.

Considering facts that most of farms are very old, buildings are not insulated, and firewood is used also for preparing food not only for individuals, but also for cattle, the amount of fuelwood use indicated by PFOs is presumptive. Owners are unlikely to overestimate the real harvest or collection amounts in forest! Also, when landowners prepare fuelwood, they provide information not only for one year but several years, suggesting that collected amount of fuelwood is higher than represented by statistics.

There are no violations of law, fixed by SFS, regarding fuelwood collection in private forests. It appears that the amount of fuelwood collection is not fully controlled and fixed and owners eventually collected more than the permitted 10 m³ of fallen and dry wood per year from forest holding. It is verified by the fact that average collected amount based on dead or dry wood reached 22 m³ per holding. Only 20% indicated collection of harvesting residues; in this group, collected amount reached 32 m³ per property per year. It appears that the use of harvesting residues is very low, representing a large under-utilized potential.

In relation to future plans, in 2008 close to half of PFOs indicated fuelwood collection or other activity providing fuelwood, but income from these activities in most recent 2 years was planned by 21 % of PFO. Such low activity level is not surprising for small forest areas where income from forest-related activities does not play a significant role. Similar results were reported for other countries with small – scale forestry (Mizaraitė and Mizaras, 2005; Setzer, 2007). This suggests that PFOs do not plan on engaging in biofuel market in the nearest future in Latvia. Low level of knowledge about this topic could also be a reason for it. But it is unlikely that PFOs will stop collecting firewood.

Firewood collection outside forest management

The PFOs in Latvia do not always see a link between forest management activities and fuelwood collection. First, it was surprising that only 78 % of the respondents who collected fuelwood from their holdings in 2001 considered it as a forest management activity. In 2008, only one-third of the respondents held the opinion that fuelwood harvesting or collection was related to forest management.

Studies conducted in other Baltic countries give evidence to a similar situation. For example, in Estonia, 54 % of PFOs had not acquired any income from forests, but the respondents considered the provision of households' timber the most important objective for forest ownership (Järvinen, Toivonen & Kaimre, 2003). In the same study, the importance of household timber was highly appreciated among the forest owners already in 1996 (Karppinen insert Year of publication). The highest mean value (3.74) in valuation of objectives for forest ownership was for firewood production for home consumption also in Lithuania (Mizaraitė, 2005). It was only one of the objectives of PFOs where difference in valuation between female and male forest owners was not observed.

Characteristics of PFO

The gender differences in aspects related to fuelwood collection did not exist in studies conducted in Latvia. Other indications of PFO groups concerned fuelwood use and collection, and were evaluated via opinion polls conducted over a ten-year period.

On average, in a group of PFOs where fuelwood was one of objectives for owning forests, there were more female PFOs than males. This group was also characterized by smallest forest holding area and shorter distance from residence place to forest holding than on average. PFO who collected firewood had considered fuelwood as very important forest function (Table 2) and marked only highest values for it – 4 and 5 points.

When considering fuelwood as a marketable product, characteristics of PFOs changed. The group who have sold firewood was dominated by male, and average size of forest holding exceeded 20 ha. Also the group interested in bio-energy market in the future was represented by 70 % male PFOs with average family forest property of up to 20 ha.

Significant interconnection existed between forest management activities and the size of the forest property ($p=0.032$), gender of PFO ($p=0.002$) and knowledge and experience of PFOs in forestry ($p=0.000$). The increase in forest activities was further correlated with an increase in knowledge and experience in forestry among the PFOs or their family members.

Forest management, knowledge of PFOs, and extension

Forest owners with largest forest estates need more information and training about markets and co-operation than forest owners with smaller estates (Järvinen, Toivonen & Kaimre, 2003). It is a point of contention because PFOs with large estates usually have more knowledge and practice, and they can define topics for further inquiry by themselves. PFOs without or with only minimal experience are not aware of the possibilities, and therefore cannot request them. Further, in Finland, it was found that markets for many non-wood goods and services were found primarily in or near towns and cities, and that these markets remained unknown to most of the forest owners (Niskanen, 2006).

Studies in Latvia support the fact that the level of knowledge has significant correlation with size of property. For example, average forest property for group who had knowledge on environmental issues was nearly two times larger than the average. Other facts bear possible negative impacts on forest management:

- percentage of PFOs without knowledge and practical experience (by self-appraisal of PFOs) in forestry has increased from 39 % in 2003 to 66 % in 2008;
- percentage of PFOs who want to increase knowledge or have additional information on forest management has decreased from 53 % in 2003 to 44 % in 2008.

Several changes were done in SFS to meet the needs of PFOs. In the beginning of the century, Developments Department was created with the task to organize extension activities. In 2004, a lot of PFOs offered opinion that they would like to have practical help from foresters, not only advisory service. In 2006, a new organization, Extension Centre of PFOs, was established under the SFS and now PFOs can get several services. Last opinion poll of PFOs in 2008 shows changes in information and extension channels required by PFOs in recent years in Latvia. In 2004, PFOs preferred mass media and printed materials; today, the top priority is given to forest specialists and extension agents.

In the world a lot of problems of PFOs were solved via different associations, societies, or cooperatives of PFOs. These would not work in Latvia, probably due to bad experiences from the Soviet times. In 2008, less than 16 % of respondents were positive toward associations, but nobody was ready to join in.

One of most popular means of attracting PFOs to do something are subsidies. Several studies have discussed roles of subsidies in sustainable forest management, and their positive or negative effects (Grayson, 1993). The case of subsidies in Ireland for establishing plantations led to negative effects today, because many of these plantations are overdue for thinning (Farelly, 2006). Evidently subsidies or other state support for bio-energy markets contribute not only to the development of new markets, but also facilitate the effective use of forest resources. In this case it is only the question of how to involve and get PFOs interested.

In Sweden, the need for the study of PFOs arose because of the low intensity of cutting among certain groups of forest owners. This phenomenon was also apparent for example in France, the federal republic of Germany, the Nordic countries, and the USA (Londstedt, 1989). Today, the world is changing very rapidly. The financial, environmental, and social conditions of PFOs can be improved when PFOs not only learn how to manage their resources, but also use this

knowledge in practice and access new markets, inter alia bio-energy market. Studies in Lithuania also confirm that the main direction for increasing the income from forests for PFOs is using of logging residues and other currently non-used wood for fuel (Mizaras, 2007). Undeniable is the importance of continuing of studies of PFOs to find tools to get owners interested in sustainable forest management and increase their activity as suppliers to the timber market.

CONCLUSIONS

Opinion polls show changes in ownership structure and decreasing activity level of forest management activities in private forest sector in the last 5 years in Latvia. Knowledge and practical skills in forest management of PFOs decreased in the last years, as well as the wish to improve or acquire competence.

PFOs give highest importance to non-economic aspects of forest use (forest as creator of ownership, potential heritage, nature protection); nevertheless forest management tendencies are influenced by economic motives. Only exception is fuelwood collection, which is the dominant reason for obtaining forest property and being a forest owner.

About 77 % of PFOs indicated fuelwood collection with an average amount of 22.8 m³ per property, but only 1/3 of PFOs considered it as a forest management activity. Actually collected volume of firewood indicated by PFOs was higher than given in data published in statistics. Development tendencies in private forest sector nowadays indicate that management of private forests has not been done in compliance with the objectives of Forest Policy and principles of sustainable management were not maintained.

Education and information of PFOs is a substantial contribution and a prerequisite to ensure proper forest management in the private forest sector. A sufficient knowledge is considered necessary for securing both the economic and ecological sustainability in private forests. The number of new forest owners without knowledge and experience will increase, and importance of developing well-functioning information and training services for these owners will increase accordingly.

Implementation of state policy targets will be determined by a large number of PFOs and their attitude to different policy implementation instruments. It is necessary to find new and attractive policy implementation instruments, which could influence PFOs to manage their forests according to the principles defined by the state. Continuation of studies of PFOs is necessary to get objective information about their needs and motivation, as well as the level of their forestry knowledge.

REFERENCES

- Economic Development of Latvia 2009. The Ministry of Economic of the Republic of Latvia. 150 p.
- Energy Balance of Latvia 2008. Central Statistical Bureau of Latvia. 78 p.
- Energy Consumption in the Household Sector was researched in 2001. Central Statistical Bureau of Latvia. 112 p.
- Farely N. 2006. The Farm Forest Resources and its Potential Contribution to Rural Development in Ireland. IUFRO International Symposium, p.p. 41 – 50.
- Forest Sector in Latvia 2008. 2009. Latvia Forest Industry Federation.. 33 p.

- Grayson A. J. 1993. Private Forestry in Western Europe. CAB International, 329 p.
- Growth Ring 2008. 2009. State Forest Service of Latvia. 36 p.
- Järvinen E., Toivonen R., Kaimre P. 2003. The Information and Training Needs of Private Forest Owners in Estonia. Pellervo Economic Research Institute. Working paper No 61.65 p.
- Londstedt L. 1989. Goals and Cutting Decisions of Private Small Forest Owners. Scand. J. For. Res. 4: 259-265.
- Mizaraitė D. 2005. Forest Ownership Objectives and Private Forestry Problems: Gender Aspects. Report, LFRI.
- Mizaraitė D., Mizaras S. 2005. The Formation of Small – scale Forestry in Countries with Economies in Transition: Observation from Lithuania. Small-scale Forest economics, management and Policy, 44 (4): 437- 450.
- Mizaras S., Mizaraitė D., Sadauskiene L. and Ozolincius R. 2007. Improving Incomes from Small – scale Forestry in Lithuania. International Symposium, p.p. 425-429.
- Niskanen A. 2006. Barriers to Entrepreneurship in Small-scale Wood and Non-wood Production in Europe. IUFRO International Symposium. p.p. 371-376.
- Setzer F. 2007. The Efforts of Private Forest Owners to Enhance Forest Management – a Theoretical Approach. IUFRO International Symposium. p.p. 450:458.
- Statistics in brief 2009. Central Statistical Bureau of Latvia. 45 p.
- Vilkriste L. 2002. Forest Policy Implementation in Private Forest sector. Summary of dissertation. LAU, 43 p.
- Vilkriste L. 2006. Role of private Forest Owners in Latvia – Support or Hindrance to Developments. IUFRO International Symposium. p.p. 526-538.
- Vilkriste L. 2008. Meža īpašumu apsaimniekošanu ietekmējošo faktoru analīze (Factors influencing private forest management). Research paper. Latvia Agriculture University. 102 p.

ARE FORESTRY CONSULTATION MEETINGS OWNER-DRIVEN? – ANALYZING THE INTERPLAY BETWEEN THE OWNER AND THE PLANNER

Outi Virkkula¹, Teppo Hujala², Raili Hokajärvi¹ and Jukka Tikkanen¹

Abstract—In Finland, holding-specific forest planning has been considered an essential policy instrument, aiming at an active and sustainable family forestry. However, in recent years the effectiveness of forest planning has been found unsatisfactory. To make desirable things happen in forests, communication in planning context has been emphasized. For this paper the speech of the planner and the owner are qualitatively assessed in real planning discussions. Empirical data from years 2007–2008 comprises video recordings of 5 meetings between Finnish family forest owners and a consulting planner, and also reflective interviews both before and after each meeting. Features of owner- and planner-drivenness are evaluated through interpreting and grouping speech acts with respect to their purpose and realization. Preliminary findings suggest that policy-driven aims guide the discussion topics, while the owner's disposition affects strongly the power relations in discussions. When the owner has personal history of forestry to review his/her actions, the interaction is more owner-driven. The planner's sensitivity to react to owners' initiatives is smaller in big issues, i.e. selecting topics to discuss, and greater in tiny issues, i.e. responding flexibly within the chosen topics. As a main conclusion, some owners need encouragement to take advantage of the more owner-driven service. Therefore professional planners need to communicate more clearly about the decision space of the situation in order to enhance the cognitive equality in the meetings. In other words, more transparency for the distinction between policy-driven issues and owner-driven issues is called for.

INTRODUCTION

Motivation to investigate forestry communication

Holding-specific Forest Management Plans (FMPs) have been considered an essential policy instrument to activate family forest owners and to contribute to national welfare (e.g. Hysing and Olsson 2005). Consultation is an essential part of planning, aiming at making it an effective informational instrument to involve and motivate forest owners. Suggestions for the main objectives of the communicative advisory work have been learning about forestry issues, and commitment to following FMPs (Tikkanen 1998, Niskanen 2005). Family forest owners are, in general, willing to receive information about their forest so the FMP is a competent starting point

¹ Oulu University of Applied Sciences, School of Renewable Natural Resources, Oulu, Finland. Contact: Outi Virkkula (Mrs.) Oulu University of Applied Sciences, School of Renewable Natural Resources, Metsäkouluntie 4-6, FI-90650 Oulu, Finland, tel +358 10 27 23409, fax +358 10 27 21260, outi.virkkula[at]oamk.fi

² University of Helsinki, Department of Forest Resource Management, Helsinki, Finland

for information exchange (e.g. Serbruyns and Luyssaert 2006). The meetings of the planner and the owner in context of FMP offer an interesting case to study the mutual roles and power relations that are present in the practical communication.

Despite the obvious potential of FMPs in evoking activity among forest owners, doubts of effectiveness have arisen (Niskanen 2005). As a consequence, a more sophisticated focus on communication has been suggested (e.g. Snyder and Broderick 1992, Hujala and Tikkanen 2008).

An improvement in the effectiveness of the FMP instrument is assumed to take place through an owner-driven planning approach (Hujala 2009), which appreciates the forest owner's communication preferences and concentrates on issues that are relevant to the owner. Traditionally however, consultation and advisory activities have followed an expert-driven mode. Forest planning meetings are typically mediated by a strong knowledge asymmetry (Linell and Luckmann 1991, Sharma 1997). In addition, it is assumed in this paper that the mutual roles of the participants are affected by cultural expectations, previous experiences of comparable communication events, and the actual behavior of both parties in the first stages of the discussion. In a stable change towards owner-drivenness, the task is to find a new balance between owner- and expert-driven modes of action (cf. Morris 2006).

Introducing the perspective of educational research

Studying social interaction has a special interest in educational sciences (Vehviläinen *et al.* 2008). Recently the pragmatic approach, aiming at grasping the most influential variables that bring about the change within learners' behavior and thinking, has become popular. Furthermore, instead of analyzing learning results (socio-cognitive approach) the learning processes as such are the objects of the inquiry (socio-cultural approach) in order to enhance collaborative learning with different kinds of pedagogical solutions (Hodkinson *et al.* 2008, see also Arvaja and Mäkitalo-Siegl 2006). These studies aim at understanding the construction of interaction in the learning situation, where the significance of the concepts such as inter-subjectivity and communication are emphasized and where language constitutes the utmost base for the research (Siljander 2005, Vanderstraeten and Biesta 2006).

According to Vanderstraeten and Biesta (2006), human communication cannot be understood as a transmission of information from sender to receiver "an sich". On the contrary, human communication is inherently attached with all sorts of meanings (both conscious and unconscious), which are actively interpreted and ascribe to something. The notion is founded on the work of pragmatists John Dewey and Georg Herbert Mead, who acknowledged people's different world-views, individual perspectives to see the world, which are challenged when engaging in a socially shared practice with other people. However, human communication is not about giving up one's own perspective, but trying to find a sufficiently similar way to see the world, so that by this common activity something can be achieved. When interacting, "we continuously make minor adjustments in our own understandings, our own ways of responding, our own ways of seeing" (*ibid.*, 166). Furthermore, by communicating we make things in common and construct shared understanding of the subject in question and the course of the interaction (see also Stahl 2004). This shared understanding is called "the common ground".

Instead of seeing this common ground as a static prerequisite for successful communication and collaboration (see Baker *et al.* 1999), it is assumed to be constructed and found in the course of

the communication between the collaborators. However, in order to start such adaptive co-construction of meaning, a certain initial level of common ground is needed (Clark and Brennan 1991). This a priori common ground derives from the talkers' past conversations, their immediate surroundings, and their shared cultural background (Clark 1993). In the course of conversation, adaptive grounding may change the common ground, which requires collaborative learning about both the communication situation and about the content on which the shared meaning is jointly generated.

The concept of common ground can be approached from different scales, which determines the potential amount of progress in talkers' perspectives during one conversation. In a small scale, when the subtlety of the discourse is in focus, learning of each others' dispositions and a shared understanding of the issues discussed can be assumed to take place. In a large scale, socio-cultural representations and mutual institutional roles of the talkers are assumed to frame the meetings, regardless of the successfulness of the in-depth communication. An adaptive change in this common ground, interpreted as a socio-cultural expectation of the communicative process, takes time and requires myriad of individual cases, public discussion of activity models in different forums, and inter-organizational learning.

Applying the analysis of communication in forest planning

The distinction above is subtle, but necessary to be drawn. In our research on forest-planning-communication, forest owner and forest consultant share a certain culturally and institutionally founded pre-understanding about who makes initiatives and how to respond. This common ground is tightly embedded on the cultural development of the communication. Up to present in the Finnish case, the common ground for forestry consultation acts has been constructed on an expert-driven interaction-model. Now, when the owner-driven model and new modes of consultancy are sought, the common ground has to be jointly reconstructed. Or to put it differently, a new kind of common ground has to be brought into existence, which is in the focus of our research analysis. What kind of grounding takes place in the consultancy meetings and how to maintain and enhance such common ground, which establishes new aspects of the collaboration (see Baker *et al.* 1999).

Another key factor to be taken into account in practical communication acts is the task environment, which refers to an “environment coupled with a goal, problem, or task – the one for which the motivation of the subject is assumed” (Newell and Simon 1972, p. 55). In other words, the task environment refers to the search space of choices and outcomes. Here, the task environment of a professional forest planner (consultant) and the task environment of a family forest owner inevitably differ, since they are doing different things or have different goals when interacting. Typically, the planner collects and integrates information from the forest and from the owner, delivers a FMP to the owner, and tries to ensure that the owner understands and gets motivated towards the recommended actions. The owner, instead, orders the FMP and waits acquiring some professional support to his/her everyday life as an owner. These actors approach the planning meeting, a joint communication act, from their own orientations, representing the differing task environments above.

OBJECTIVES

This paper investigates the communicative means of participants in forestry consultation (extension) meetings to address initiatives and adaptation, which are based on the evolving of the

common ground in different task environments in each communication act. The aim is to recognize and evaluate the features of communication that indicate the owner- and expert-drivenness in the meetings. The overall hypothesis is that current forestry consultancy meetings correlate strongly with the initiatives of the consultant, which, again, have a significant effect on the actualization of forest planning.

DATA AND METHODS

The forest planning system of non-industrial private forests in Finland consists of Regional Forest Inventories (RFIs), and at the holding-level Forest Management Plans (FMPs). Because the state subsidizes RFIs, the owner pays only a share of the total planning costs. When ordered by an individual forest owner, a holding-specific FMP is compiled based on the RFI data. Marketing the plan to owners and advising the use of the plan are included in the planning process. Along with the field inventory a treatment suggestion is determined for each stand. A FMP contains stand wise data as well as information about incomes and costs and a summary of the growing stock, growth, cuttings, silvicultural operations and biotypes having special importance for nature conservation. Figures and thematic maps illustrate the data. Consultation includes a plan delivery, and it may occur in any phase of the process. It is also notable that FMPs are voluntary for forest owners in the Finnish system. (Nuutinen 2006, Hokajärvi *et al.* 2009)

The research is conducted by using the approach of design based research (DBR), which applies well to multidisciplinary projects carried out closely together with practitioners (Bereiter 2002). DBR is defined as *progressive refinement*, where a well-formulated instructional design is iteratively tested, evaluated and revised so that it responds to questions arisen from the real-life practice, but also advances the theoretical issues. DBR takes the research to authentic environment to find out what works there. (DBR Collective 2003, Collins *et al.* 2004, Hämäläinen 2008.) The design of the research is the responsibility of a private forest consultation, which determines the recommended holding-specific forest planning interactions. The data has been collected in 2007–2008 and it comprises altogether over 20 hours of video recordings of semi-formal FMP meetings and recorded reflective interviews before and after the meetings. (For this paper however, only 5 out of 13 cases were analyzed.) Such approach has recently been applied in studying farmers' communication with their consultants (Bergeå 2007), but not in forestry communication according to the authors' knowledge.

Allwood, Nivre and Ahlsén (1992) have distinguished four basic communicative functions essential to (face-to-face) communication and to information exchange: 1) Contact (whether the interlocutor is willing and able to continue the interaction), 2) Perception (whether the interlocutor is willing and able to perceive the message), 3) Understanding (whether the interlocutor is willing and able to understand the message) and 4) Attitudinal reaction (whether the interlocutor is willing and able to react and adequately respond to the message, specifically whether s/he accepts or rejects it). As Baker *et al.* (1999) emphasize, these linguistic forms have a certain ordering and constitute the basic mechanisms by which the common ground is achieved and maintained.

The precise form of each aspect varies according to task and used medium, i.e. what is tried to be achieved and with which communication techniques, e.g. video conference, computer chat, telephone and face-to-face conversation (Clark and Brennan 1991, see also Baker *et al.* 1999,

Dillebourg and Traum 1999). Current holding-specific forest consultancy procedure takes place typically in face-to-face meetings preceded by at least one telephone conversation. We believe that face-to-face meetings are crucial when trying to enhance the effective actualization of the forest plans, and therefore have focused on them. Furthermore, taking into consideration the *principle of least collaborative effort* that people should concentrate on grounding with those techniques that require the least combined effort (see Clark and Brennan 1991), analyzing and comparing the initiative and adaption of the participants of the consultancy meetings proves to be important.

The present analysis was conducted by using the principles of qualitative content analysis and coding (Creswell 2008). We followed the example of Baker *et al.* (1999, p. 44) who claim grounding in collaborative learning situations to be primarily language-based. The collaboration was elicited through linguistic activities (speech acts), where in the focus of the analysis are for instance collaborative completion, recapitulation and short positive feedback (Laurinen and Marttunen 2007), but also, in our case, the initiatives of the participants. The units of analysis were speech turns. We acknowledge the challenge presented by Hmelo-Silver (2003, see also Strijbos and Fischer 2007) when analyzing the features of collaborative interaction. Hmelo-Silver (*ibid.*) uses the parable of three blind men and an elephant to illustrate the difficulties, and claims for multiple methods in order to understand the interaction. Also the carefulness of defining the codes and guidelines about how to do qualitative measuring reliably and validly are to be taken into account (see Beers *et al.* 2007).

PRELIMINARY RESULTS

The data includes a number of speech acts which, emphasizing the aspect of attitudinal reaction of communication, could be interpreted as well-motivated initiatives or responses to them. According to our preliminary analysis of the interplay the speech turns could be classified in the following categories:

- Topic change proposal
- Concrete question
- Direct answer
- Fact-rich explanation
- Narrative description

Of the categories above, the topic change proposals were used by the planner only in order to frame and drive the discussion. Question–answer sequences, on the other hand, were initiated by both participants. Planner’s questions aimed usually at ensuring owner’s comprehension, while owner’s questions related most often to the details of forestry treatments. The educational character of communication became evident via the wealth of fact-rich explanations by the planner. It seems that the narrative descriptions provided the most practical and contextual perspectives, and these speech turns, which were used by both talkers, notably contributed to the mutual understanding.

Some examples from the discussions:

a) Topic change proposal + reaction (framing move)

P (planner): “Well, here’s the development class distribution, is that term familiar to you?”

O (owner): “Yes I know something about it but you may clarify a little bit.”

P: “Yeah, so it’s like the rotation of the forest is divided into development classes just like with humans so that you start from children and end up with the elderly...”

O: “Yess.”

[C5: 17:10; communication event #5, passage starting at 17:10 minutes from the beginning]

b) Concrete question + direct answer (initiated by the planner)

P: “How is the Act on the Financing of Sustainable Forestry familiar to you?”

O “Well it’s not very familiar to me.”

P: “Do you know then when you make self-active forestry treatments and the state pays a subsidy...”

O: “Oh is it this young stand treatment?”

P: “Yes, it is precisely what it is all about!”

O: “Oh yeah.”

[C4: 04:25]

c) Concrete question + direct answer (initiated by the owner)

O: “How is it with these stands where the age is rather high, shouldn’t these be harvested soon right?”

P: “Well not necessarily: those forests are ditching areas, they were already old at the time of ditching, so the age is high but it still grows well...”

O: “Oh, grows...”

[C1: 1:30]

d) Fact-rich explanation (educational view)

P: “Now when there have been no harvestings, the development class distribution is a little bit distorted if you consider sustainability, so if you consider pursuing small incomes evenly so that there would always be forests in all development classes, it means that you should always regenerate forests to get saplings and...”

O: “Yeah, yeah!”

P: “...so that all classes exist all the time and it continuously forms kind of a circle...”

[C1: 13:00]

e) Narrative description (initiated by the planner)

P: “Was that stand, do I remember right that it would have been thinned?”

O: “Yes, it is.”

P: “There you can also find nutrient deficit.”

O: “This particular area within this parcel was latest on meadow use.”

P: “Here you can certainly see it in the trees that the hay had been taken away.”

[C3: 24:00]

f) Narrative description (initiated by the owner)

O: “Yeah this is familiar... [looking at the map] here, here’s such a seed tree area and yeah, indeed here is some young stands, and here I’ve been thinking that maybe I will soon...”

P: “Yess.”

O: “...make thinnings here, this is rather poor soil, you can’t keep it very dense.”

[C2: 20:20]

CONCLUSIONS AND IMPLICATIONS

The preliminary results show that the planner’s leading role is rather strong and easily accepted by the owners. In our empirical cases, this may be a result from the planner’s particularly active role or the particular owners’ passive, expert-acceptant attitude. Despite the fact that the planner did ask personal questions and encouraged the owners in participating, the owners in general did not dare to take a driving role although they communicated more or less vividly. Possibly this is a consequence of a strong institutional role-setting in which the duty of the owner is simply to listen what the expert has to say and respond when asked for. It may be culturally rather a new idea that a more active role is expected from the owners and that the planner is supposed to facilitate the owners towards empowerment. Therefore, some owners seem to need more encouragement to take advantage of the potential owner-driven service.

Practically, professional planners need to communicate more clearly about the owner’s decision space in the planning situation – i.e. open up the owner’s task environment – in order to enhance the cognitive equality in the meetings. This means paying more attention to the objectives of the communication event, and letting the owner decide how to proceed. In other words, more transparency for the distinction between policy-driven issues and owner-driven issues is called for. This means clear meta-argumentation about which issues are expert recommendations and which are under the owner’s genuine command.

It was also observed that when the owner has personal history of forestry to review with the planner’s actions (owner-initiated narrative descriptions), the interaction is more owner-driven than in other cases. The planner’s sensitivity to react to such owners’ initiatives is smaller in big issues, i.e. in selecting topics to discuss, and greater in tiny issues, i.e. in responding flexibly within the chosen topics. Basically the observed communication between the participants was collaborative, but the extent to which the owner made distinct initiatives seemed to be relative to his personal behavioral style.

Dillebourg and Traum (1999, see also Laurinen and Marttunen 2007) have presented three aspects to approach collaborative speech acts: linguistic level, cognitive level and social level. At the linguistic level the focus is on the meaning of verbal expression (understanding of sentences and even single words), at the cognitive level grounding is about making sense of a problem or task alignment (e.g. the content and quality of speech acts in consultancy meetings) and at the social level, grounding refers to participants' mutual belief that they understand each other and the task at hand. As Laurinen and Marttunen (ibid.) point out, in practice, all levels are deeply intertwined, yet the interplay between the forest owner and forest consultant directs the interest more to the linguistic and social levels. Strong indicators both for social and linguistic levels prove that the meetings are more collaborative than first anticipated. As theoretically sound and empirically observed, this perspective on forestry consultation encourages us to continue analyzing the present data deeper and seek features of collaborative learning from the multi-faceted speech turns. The awaited results and implications will help policy-makers, consultants and facilitators, as well as family forest owners, to continue on the road towards smooth and well-balanced communication.

REFERENCES

- Allwood, J., Nivre, J. and Ahlsén, E. 1992. On the semantics and pragmatics of linguistic feedback. *Journal of Semantics* 9(1): 1–26.
- Arvaja, M. and Mäkitalo-Siegl. 2006. Yhteisöllisen oppimisen kognitiiviset, sosiaaliset ja kontekstuaaliset tekijät [The cognitive, social and contextual factors of collaborative learning]. In: Järvelä, S., Häkkinen, P. and Lehtinen, E. (eds.). *Oppimisen teoria ja teknologian opetuskäyttö* [Theory of learning and the use of technology in teaching]. Porvoo: WSOY, 125–146. (In Finnish.)
- Baker, M., Hansen, T., Joiner, R. and Traum, D. 1999. The role of grounding in collaborative learning tasks. In: Dillenbourg, P. (ed.) *Collaborative Learning. Cognitive and Computational approaches*. Oxford: Elsevier Science, 31–63.
- Beers, P.J., Boshuizen, H.P.A., Kirschner, P.A. and Gijsselaers, W.H. 2007. The analysis of negotiation of common ground in CSCL. *Learning and Instruction* 17(4): 427–435.
- Bereiter, C. 2002. Design research for sustained innovation. *Cognitive Studies, Bulletin of the Japanese Cognitive Science Society* 9(3): 321–327. Available at: http://www.ikit.org/fulltext/2002Design_Research.pdf. [Cited Nov 25th 2008.]
- Bergeå, H. 2007. Negotiating fences: interaction in advisory encounters for nature conservation. *Acta Universitatis agriculturae Sueciae*, 2007:130. Doctoral Thesis, Swedish University of Agricultural Sciences. 177 p. + 4 articles. Available at: <http://diss-epsilon.slu.se/archive/00001647/>. [Cited 25th March 2009.]
- Clark, H.H. 1993. *Arenas of Language Use*. University of Chicago Press.
- Clark, H.H. and Brennan, S.E. 1991. Grounding in communication. In: Rosnick, L.B., Levine, J.M. and Teasley, S.D. (eds.). *Perspectives on socially shared cognition*. Washington D.C.: American Psychological Association, 127–149.
- Collins, A., Joseph, D. and Bielaczyc, K. 2004. Design research: Theoretical and methodological issues. *The journal of the learning sciences* 13(1): 15–42.
- Creswell, J.W. 2008. *Educational research. Planning, conducting, and evaluating quantitative and qualitative research*, 3rd ed.. New Jersey: Pearson Merrill Prentice Hall.

- Design-Based Research Collective. 2003. Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher* 32(1): 5–8.
- Dillenbourg, P. and Traum, D. 1999. Does a shared screen make a shared solution? In: Hoadley, C. and Roschelle, J. (eds.). *Proceedings of the Third Conference on Computer-Supported Collaborative Learning*, Article No. 14, 127–135. Available at: <http://portal.acm.org/toc.cfm?id=SERIES11363&type=series&coll=GUIDE&dl=GUIDE&CFID=25853483&CFTOKEN=17307748> [Cited March 20th 2009.]
- Hodkinson, P., Biesta, G. and James, D. 2008. Understanding learning culturally: Overcoming the dualism between social and individual views of learning. *Vocations and Learning* 1, 27–47.
- Hokajärvi, R., Hujala, T., Leskinen, L. and Tikkanen, J. 2009. Effectiveness of Sermon Policy Instruments: Forest Management Planning Practices applying the Activity Theory Approach. Submitted manuscript, 31 p.
- Hmelo-Silver, C. E. 2003. Analyzing collaborative knowledge construction: multiple methods for intergrated understanding. *Computers and Education* 41, 397–420.
- Hujala, T. 2009. Owner-driven decision support in holding-specific forest planning. Doctoral Thesis, University of Helsinki, Finland. *Dissertationes Forestales* 85. 40 p. + 4 articles.
- Hysing, E. and Olsson, J. 2005. Sustainability through Good Advice? Assessing the Governance of Swedish Forest Biodiversity. *Environmental Politics* 14(4): 510–526.
- Hämäläinen, R. 2008. Designing and investigating pedagogical scripts to facilitate computer-supported collaborative learning. Finnish Institute for Educational Research. *Research Reports* 24. University of Jyväskylä. Available at: <http://ktl.jyu.fi/ktl/english/publications/t024>. [Cited March 25th 2009.]
- Laurinen, L. and Marttunen, M. 2007. Written arguments and collaborative speech acts in practicing the argumentative power of language through chat debates. *Computers and Composition* 24(3): 230–246.
- Linell, P. and Luckmann, T. 1991. Asymmetries in dialogue: Some conceptual preliminaries. In: Marková, I. and Foppa, K. (eds.). *Asymmetries in dialogue*. Hemel Hempstead: Harvester Wheatsheaf, 1–20.
- Morris, C. 2006. Negotiating the boundary between state-led and farmer approaches to knowing nature: An analysis of UK agri-environment schemes. *Geoforum* 37, 113–127.
- Newell, A. and Simon, H.A. 1972. *Human problem solving*. Englewood Cliffs, NJ: Prentice Hall.
- Niskanen, Y. 2005. Metsäsuunnitelman vaikutus metsänkäyttöpäätökseen [Effect of forest plans on forest utilization decisions]. Doctoral Thesis, University of Joensuu, Finland. *Dissertationes Forestales* 10. Available at: <http://www.metla.fi/dissertationes/df10.htm>. [Cited March 25th 2009.] (In Finnish with English Abstract.)
- Nuutinen, T. 2006. Forest Planning in Private Forests in Finland. In: Nuutinen, T., Kärkkäinen, L. and Kettunen, L. (eds.). *Forest planning in private forests in Finland, Iceland, Norway, Scotland and Sweden*. Proceedings of ELAV seminar, 23-24 March 2006, Koli, Finland. Working Papers of the Finnish Forest Research Institute 38: 28–31. Available at: <http://www.metla.fi/julkaisut/workingpapers/2006/mwp038.htm>. [Cited March 25th 2009.]
- Serbruyns, I. and Luysaert, S. 2006. Acceptance of sticks, carrots and sermons as policy instruments for directing private forest management. *Forest Policy and Economics* 9(3): 285–296.
- Sharma, A. 1997. Professional as agent: Knowledge asymmetry in agency exchange. *Academy of Management review* 22: 758–798.
- Siljander, P. 2005. Systemaattinen johdatus kasvatustieteeseen [Systematic introduction to educational science]. Keuruu: Otava. (In Finnish.)

- Snyder, L.B. and Broderick, S.H. 1992. Communicating with woodland owners. *Journal of Forestry* 90(3): 33–37.
- Strijbos, J.-W. and Fischer, F. 2007. Methodological challenges for collaborative learning research. *Learning and Instruction* 17, 389–393.
- Stahl, G. 2004. Building collaborative knowing. Elements of a social theory of CSCL. In: Strijbos, J.-W. (ed.). *What we know about CSCL: And implementing it in higher education*. Hingham: Kluwer Academic Publishers, 53–85.
- Tikkanen, J. 1998. Planning as learning: a new paradigm for implementing sustainable forestry. In: Hytönen, M. (ed.). *Social sustainability of forestry in the Baltic Sea Region*. Finnish Forest Research Institute, Research Papers 704, 85–97.
- Vanderstraeten, R. and Biesta, G. 2006. How is education possible? Pragmatism, communication and the social organisation of education. *British Journal of Educational Studies* 54(2): 160–174.
- Vehviläinen, S., Tainio, L. and Penttinen, L. 2008. Vuorovaikutus ja oppiminen [Collaboration and learning]. *Kasvatus* 5/2008, 417–421. (In Finnish.)

PRESENTATION ONLY ABSTRACTS

THE ECONOMICS AND PROCUREMENT OF WOOD BIOMASS FOR ENERGY PRODUCTION IN NORTHWESTERN ONTARIO

Bedarul Alam¹ and Reino Pulkki²

¹PhD Candidate, Faculty of Forestry and the Forest Environment, Lakehead University, 955 Oliver Road, Thunder Bay, Ontario, Canada P7B 5E1. Telephone: 807 343 8221; Fax: 807 343 8116;(email: mbalam@lakeheadu.ca)

²Professor and Dean, Faculty of Forestry and the Forest Environment, Lakehead University, 955 Oliver Road, Thunder Bay, Ontario, Canada P7B 5E1. Telephone: 807 343 8564; Fax: 807 343 8116; (email: rpulkki@lakeheadu.ca)

Abstract: Biomass has been recognized all over the world as having great potential for conversion into carbon neutral bioenergy. The Ontario Government is investigating the possibility to replace lignite coal with renewable wood biomass as feedstock for the Atikokan Generating Station located in northwestern Ontario. A detailed assessment of the economic availability of wood biomass resources is necessary for estimating the economic viability of its use for power generation. Sustainable generation of power requires an accurate estimate of the wood biomass economically available in this region. Moreover, to retain thermal value of wood biomass and to supply biomass feedstock to the power generating station in a sustainable way, an economic storage method is also important. Though studies on biomass storage methods have been done in European countries, these are not applicable in northwestern Ontario because the studies were related to their local situation. There has not been a study on wood biomass storage, which solves the efficient biomass storage problem in northwestern Ontario. In addition, an economical wood biomass procurement system for energy production is necessary to keep the wood biomass procurement business profitable and sustainable in this region. A supply chain management model is being developed: (i) to accurately assess the economic availability of wood biomass in northwestern Ontario by incorporating different forest types, species combinations, and harvesting methods and systems; (ii) to look at options for centralized processing of biomass as chips, ground or pellets; (iii) to determine the methods and locations for biomass storage that can help minimize wood biomass degradation and improve energy yield; and (iv) to minimize wood biomass transportation and processing cost by using a spatial database-heuristic programming and integrated wood biomass harvesting and transportation system. The wood biomass of 58 million ha forest area of Ontario can fulfill at least 27% of the energy requirement of the province. The average energy content of wood biomass is 18 GJ per bone-dry tonne. The average biomass recovery is 21 oven dry tonne per hectare. The optimum time of wood biomass storage in uncovered pile is up to 2 years. The supply chain management model will help estimate the total quantity, quality and cost of wood biomass from the forest that will help in effective and efficient planning of the utilization of renewable forest resources for power generation in Atikokan and other power generating stations in northwestern Ontario.

FOREST COOPERATIVES: VEHICLES FOR WEAVING PARCELIZED FOREST LANDSCAPES FOR LARGE-SCALE RURAL DEVELOPMENT AND FOREST STEWARDSHIP OUTCOMES

Scott Bagley, Colin Donohue, and Bryce Oates

Program Director, Executive Director, and Enterprise Development Specialist, respectively, National Network of Forest Practitioners, 8 North Court Street, Suite 411, Athens, OH 45701 (email: scott@nnfp.us), Tel. 740-593-8733, Website: www.nnfp.org.

Abstract: Much was made of the 2003 closure of the Sustainable Woods Cooperative in southwest Wisconsin, and many natural resources professionals have written off the cooperative business model as a result. But many other forest cooperatives are still in business or have become established in the meantime, growing steadily and providing a suite of services for hundreds of member landowners and tens of thousands of acres of family forest lands across the United States. In addition to providing stewardship planning services, administering timber sales and forest improvement projects, and in some cases processing and marketing value-added products, forest cooperatives are also showing promise as tools for maintaining stewardship continuity across generations, as the older generation of landowners passes on their land to heirs.

This presentation will provide an overview and examples of the ways cooperatives in all regions of the United States are bringing more landowners into forestry who were not resonating with the messages and brands offered by industry and government, coordinating cross-boundary projects to enable treatment of small-acreage parcels otherwise not accommodated by the traditional forest industry, and generating efficiencies that enable FSC certification for small-scale forest operations. Additionally, the authors will describe how cooperatives are developing local workforces that are tailored to meet the challenges of parcelized landscapes and the evolving demands of the growing number of new landowners. They will also provide examples of cooperatives providing stable job opportunities for rural communities and facilitating peer-to-peer learning between landowners. Finally, they will describe the growing network of forest cooperative leaders who are working together to share lessons learned and compare notes of their progress, while developing a policy voice for small-scale forestry at local, regional, and national levels.

SOCIO-ECONOMIC IMPACT OF WOOD BASED UTILIZATION FOR ENERGY PRODUCTION ON SMALL RURAL COMMUNITIES IN NORTHWESTERN ONTARIO, CANADA.

Cassia Sanzida Baten¹ and Reino Pulkki²

¹ PhD Student, Faculty of Forestry and the Forest Environment, Lakehead University, 955 Oliver Road, Thunder Bay, Ontario P7B 5E1, Canada (email: csanzida@lakeheadu.ca)

² Professor and Dean, Faculty of Forestry and the Forest Environment, Lakehead University, 955 Oliver Road, Thunder Bay, Ontario P7B 5E1, Canada. Tel: 807 343 8564. Fax: 807 343 8116. (email: rpulkki@lakeheadu.ca)

Abstract: Wood biomass is a major component of the renewable energy and fuels picture for Canada. Wood biomass has great potential for conversion into renewable bioenergy and to help mitigate climate change. This study deals with the socio-economic aspects of bioenergy development. Normally, the socio-economic impact of bioenergy can be measured in terms of economic indices, such as employment, monetary gains, and GDP. Recently some pulp and paper mills in northwestern Ontario have initiated bioenergy plants to generate heat and electricity for their use. The Ontario Ministry of Energy is investigating the possibility of replacing lignite coal with renewable forest biomass as feedstock for the Atikokan Power Generating Station (AGS), as well as at the Thunder Bay Generating Station (TBGS) located in northwestern Ontario. The AGS has already successfully tested 100% wood biomass (wood pellets) feedstock instead of coal. This study will evaluate the socio-economic impacts of wood biomass utilization for energy production in four areas of northwestern Ontario: Atikokan, Fort Frances, Kenora and Thunder Bay. It will examine the impacts of wood biomass utilizations on job creation, business development, income improvement, and well-being of the people. It will develop models to improve the bioenergy sector of the northwestern Ontario.

SMALL-SCALE FORESTRY IN THE UNITED STATES: OLD CHALLENGES AND NEW OPPORTUNITIES

Brett J. Butler

U.S. Forest Service, U.S. Forest Service, 160 Holdsworth Way, Amherst, MA 01003 (email: bbutler01@fs.fed.us), Tel: 413-545-1387

Abstract: Forestry in the United States, as we think of it today, began in earnest in the early 1900s with Gifford Pinchot, Carl Schenk, and the other American forestry pioneers. The focus of public policies, and social scrutiny, was on public lands and so it stayed for the better part of a century. By the close of the twenty-first century, the focus was broadening and more people in forestry and land conservation were paying attention to private forest lands, and to private forest land owners. The general public, on the other hand, still believes most forest land is publicly owned and this is a major obstacle that needs to be overcome. In reality, 56 percent of the 304 million hectares of forest land in the United States are privately owned and of that, nearly two-thirds is owned by families and individuals – i.e., small-scale forest owners.

There are over 10 million family forest owners in the United States and they have diverse objectives, needs, and limitations that we are just beginning to fully understand. Traditional forest management practices are often inappropriate for the average landowner because their holdings are too small, the practices conflict with their ownership objectives, costs are prohibitive, and many lack basic knowledge about management.

New opportunities for family forest owners are emerging, such as carbon sequestration and biomass harvesting. Unfortunately, many of these new tools are still immature and may still be inappropriate for many forest owners. These failures are, at least in part, driven by the disconnect between forestry and forest land owners.

To deal with this divide, we need to develop tools and policies that are appropriate for the land owners – we need to see the forests through their eyes. Loss of forest land, timber supply, protection of endangered species, protection of drinking water, mitigation of forest health issues – these will all require the active participation of family forest owners. Will forestry continue to use old tools to deal with old problems or will we create the new tools to meet the new challenges?

MITIGATING CLIMATE CHANGE THROUGH SMALL-SCALE FORESTRY IN THE US: FOREST MANAGEMENT PRACTICES AND MARKET OPPORTUNITIES

Susan Charnley¹ and David Diaz²

¹USDA Forest Service, Pacific Northwest Research Station, 620 SW Main St., Suite 400, Portland, OR 97205; (email: scharnley@fs.fed.us) Tel: 503-808-2051

²Ecotrust, Portland, OR; Hannah Gosnell, Dept. of Geosciences, Oregon State University, Corvallis, OR

Abstract: Family forest owners in the U.S. can be proactive in helping mitigate global climate change by adopting forest management practices that increase carbon sequestration. They may receive financial compensation for doing so by registering and trading carbon offset credits for forestry projects that qualify in existing carbon markets. Providing an income stream to forest owners through carbon offset trading not only rewards them for contributing to climate change mitigation; it can create an incentive for sustainable forest management, and help slow the conversion of forest lands to development.

This paper provides an overview of the current state of scientific knowledge regarding what forest management practices are best for optimizing carbon uptake and preventing carbon release from forests. This information is useful for helping forest owners assess whether carbon-friendly forest management is consistent with their other forest management goals and practices, and realistic for them to adopt. It then reviews current and emerging opportunities for family forest owners to participate in carbon markets through forestry in the U.S., and addresses some of the potential challenges to participation.

The absence of federal climate change legislation in the U.S. and of mandatory emissions trading programs means that current mechanisms for rewarding landowners who exhibit carbon-friendly management are limited and not very lucrative. However, federal legislation is on the horizon, and policy about what kinds of forest management practices to reward, and how, is evolving. We conclude by discussing how policies and carbon markets can best support the participation of small-scale forestry in climate change mitigation.

A REVIEW OF THE CONSTRAINTS TO SMALL-SCALE FOREST HOLDERS ENGAGING IN CARBON MARKETS

Paul Dargusch and John Herbohn

School of Integrated Systems, University of Queensland, St Lucia, Queensland, Australia;
(email: p.dargusch@uq.edu.au)

Abstract: This article reviews the constraints to small-scale forest holders from developed and developing countries engaging in both regulated and voluntary carbon markets through the supply of emissions offsets from both planted and natural forest-based activities. The authors assert that three types of issues feature most prominently in constraining small-scale forest holders from fully engaging across the carbon market value chain. These constraints are that small-scale forest holders typically: (1) lack sufficient technical skills across the gamete of forestry, commercial and legal compliance requirements to engage in carbon markets; (2) cannot afford the transaction costs involved in engaging in carbon markets; and (3) lack marketing skills and access to networks of buyers that should facilitate maximum revenue gain from carbon sales. Opportunities for small-scale forest holders and policy-makers to address these constraints are discussed.

PRODUCTS AND SERVICES FROM MANAGEMENT OF FIRE-ADAPTED FORESTS: THE PERSPECTIVES AND PRACTICES OF FAMILY FOREST OWNERS IN OREGON, USA

A. Paige Fischer

Research Social Scientist, Pacific Northwest Research Station, USDA Forest Service, 3200 SW Jefferson Way, Corvallis, OR 97331 (Email: paigfischer@fs.fed.us), Tel: 541-758-7793

Abstract: The severe fire events of the past decade in the American West have led to an emphasis on management to reduce hazardous fuels and restore fire-adapted forests on federal and nearby private lands. Yet markets for much of the material from thinning are lacking. Creating new opportunities for products and services generated through thinning may provide financial incentives for restoration. Family forest owners are especially important to consider in such policy directions because they hold 12% of forest land in the western United States and manage for social, economic and ecological goals.

This paper presents findings from an ongoing two-year study of how family forest owners in the ponderosa pine ecosystem of eastern Oregon address the risk of wildland fire on their lands. We draw on spatial data to describe the conditions on their lands, and we use interview and survey data to explain how they view and manage fire risk, and perceive opportunities and constraints for restoration. In particular we explore the relationship between owners' management practices, attitudes toward risk, ecological knowledge and views on cooperating with public agencies and other ownership groups. The findings will help federal and state agencies improve program offerings and design new policy instruments.

A SUMMARY OF ROUNDWOOD UTILIZATION IN WEST VIRGINIA IN 2008.

Shawn T. Grushecky¹, Jan Wiedenbeck², and Ben Spong¹

¹West Virginia University, Appalachian Hardwood Center, PO Box 6125, Morgantown, WV 26506 (email: sgrushec@wvu.edu).

²USDA Forest Service, Princeton, WV

Abstract: West Virginia currently has the second highest proportion of forestland in the United States. This resource supports a forest products industry that adds \$5 billion to the state's economy each year. Roundwood is harvested in every county of the state and supports a diverse primary and secondary forest products sector. The objective of this research was to investigate the utilization of hardwood trees harvested in West Virginia. Utilization and market data were collected on thirty active timber harvests in 2008. Results indicated that loggers transported materials from WV timber harvests to an average of 3.5 roundwood markets. The main markets supplied were sawlog and softwood pulp. Differences exist in the characteristics of roundwood markets utilized by logging operators in 2008 compared to earlier studies. Changes in resource availability and market opportunities likely created these differences.

THE FUTURE OF PENNSYLVANIA'S FORESTS: ENGAGING PRIVATE FOREST LANDOWNERS IN THEIR DECISION MAKING PROCESSES CONCERNING THEIR FORESTLAND

Joshua B. Gruver, James C. Finley, A.E. Luloff, and Allyson Muth

The Pennsylvania State University, 234 Forest Resources Building, University Park PA. 16801
(Email: jbg166@psu.edu), Tel: 814-863-3591

Abstract: Forests dominate Pennsylvania covering nearly 60 percent of its landscape. An estimated 750,000 private forest landowners (PFLs) hold 70 percent (more than 12 million acres) of this forest. The number of PFLs increases each year as landowners divide and sell or gift their forestland. As forestland ownerships increase and change, fragmentation increases the potential for urban development. The decision making processes PFLs engage when planning for their forestland's future are not well understood.

Recent state-wide survey results indicate over 52 percent of PFLs plan to leave forestland to more than one heir. Further, approximately 9 percent are planning to subdivide, 27 percent are planning to sell, and 11 percent expressed interest in conservation easements. Using key informant, phenomenological, semi-structured interviews, and a statewide survey we explore PFLs motivations and decision making processes as they plan for the future of their forestland. We provide analysis on their planning processes and discuss themes derived from their actions as they decide to either, subdivide and sell forestland, leave forestland to heirs, sell or donate conservation easements, or commit to none of these options.

To provide context and a richer understanding of how PFLs make decisions about their forestland, we approached those who had recently subdivided and sold forestland, gifted forestland, sold conservation easements, or had not yet committed to any plan in three counties and asked them to tell us about their experiences. Study counties were categorized as being highly developed, moderately developed, or rural. This paper presents preliminary data from these interviews. Findings suggest PFLs typically own land for amenity values (aesthetics, recreation, solitude), but recognize economic needs become paramount at certain points of their ownership. In addition, PFLs have several misconceptions about conservation easements, including loss of control of the land in easement and increased public access if the land is sold to a trust or conservancy. Possible implications of these findings are advanced.

TRUTH, LIES AND SOMETHING IN BETWEEN--KALEIDOSCOPIC THOUGHTS ABOUT PRESENT ROLE AND PROSPECTS OF BEYOND-TIMBER PRODUCTS IN A HIGHLY INDUSTRIALIZED CONTEXT

Christoph Hartebrodt

Forstliche Versuchs- und Forschungsanstalt Baden-Württemberg (Germany) Wonnhaldestraße 4, 79100 Freiburg. Tel: +49 761 4018 262, (email: christoph.hartebrodt@forst.bwl.de)

Abstract: For centuries forest activities have focused mainly on timber-production, predominantly for owners but for society as well, due to the fact that forestry contributed directly and significantly to the gross domestic product. This focus on macro-economic key-figures decreased dramatically after 1900 and particularly after World War II. With regard to the micro-economic sphere, forestry was a profitable business up until the mid-sixties. After this time cost-prize squeeze caused a severe economic crisis and led to decreasing profitability. Catastrophic events showed the vulnerability of this single product policy. Within these framework conditions an intense discussion about the valuation of beyond timber products started.

Considering this framework the paper highlights –firstly the financial relevance of beyond-timber products during the last three decades. An analysis of the present sensitivity of profitability to non-timber revenues and a prognosis about the potential impact of these new forest products is given. Both are based on the Bayesian Belief Network approach, informed by accountancy network data. At a glance it can be stated, that the significance of beyond timber products remained low up until the present day and, moreover, is expected to remain low during the next decades.

Secondly, the paper raises the question, as to whether the perception that small-scale management is mainly dedicated to timber production is correct. The paper shows that small scale forestry is in most cases embedded in enterprises, which run various kinds of economic activities. Therefore the potential economic role of beyond timber products has to be discussed from different point of views within different size classes and ownership types.

Finally a contribution is made to the question, as to whether the starting point of the beyond timber product discussion, the low macro-economic importance, needs to be redefined. More and more evidence shows that even in the context of a highly industrialized country the wood cluster, which includes the whole wood-production-chain from forests to high-end products, remains important.

Finally we argue that new beyond-timber products can be an important supplement for most forest enterprises. Despite this fact, neither from a micro- nor a macroeconomic perspective, can a complete shift to non-timber products be expected or recommended.

AGROFORESTRY SYSTEMS ON SMALL RURAL PROPERTIES: A CASE STUDY IN THE STATE OF PARANÁ, BRAZIL

Vitor Afonso Hoeflich¹, Alexandre França Tetto, José Tarciso Fialho, and Renato Viana Gonçalves

Universidade Federal do Paraná, Programa de Pós-graduação em Engenharia Florestal, Av Pref Lothário Meissner, 900, Jardim Botânico, 80210-170 – Curitiba – Paraná – Brazil. Tel: 5541-33604320 ¹(Email: vitor.ufpr@gmail.com; hoeflich@ufpr.br)

Abstract: According various authors, the term agroforestry system refers to sustainable land-use systems in which woody perennials are grown in association with herbaceous plants, and/or livestock, generating ecological and economic interactions between the trees and the other components of the system. It is recognized that although the agroforestry system concept is well known and has been applied in many geographic areas throughout the world, its potential has not been fully explored. Over the years, this system has been virtually abandoned by their complexity, leading to monocultures. It was noted, however, the need to rescue it in the light of the numerous benefits. This study was conducted in the State of Paraná, located in southern Brazil, which is a major supplier of summer grain, poultry and forest products. In the state, 86% of areas are considered small farms (area under 50 ha). In these areas there is a need to maximize the use of land and income through sustainable activities, making them economically, where the agroforestry systems are considered an interesting alternative of land use. The State Government of Paraná has encouraged over the past five years the implementation of agroforestry systems on small rural properties. The objective of this research was to examine the history, planning and monitoring the agroforestry systems, and the opportunities and challenges generated to the farmers.

In terms of methodological procedures, data collection consisted of a literature search for the context and theoretical framework as well as interviews, questionnaires and application technicians and producers in the sample areas. It was observed that the environmental gain and income of farmers increased because of the consortium, especially among the growing activities of forest to agriculture or livestock. Furthermore, areas associated with forest crops, so a microclimate with lower temperatures and higher humidity, have a lesser impact in the dry season, reducing the use of supplementary food and providing greater thermal comfort for cattle raising. However, some aspects were found that need to be better analyzed, such as: definition and integration of agroforestry systems in forestry legislation, establishment of technical and economic parameters driving the system, enabling the financing of the activity; the need for hiring and training more the *technicians* of the *extension services*, acting directly in the municipalities, and expanding the network of the system by the better understanding of the producers, about their economic and environmental benefits.

SMALL-SCALE FOREST MANAGEMENT AND ECOSYSTEM SERVICES: OPPORTUNITIES IN THE US

Bill Hubbard and Sarah Ashton

Southern Regional Extension Forestry, Forestry Bldg. 4-433, University of Georgia, Athens, GA 30602 ¹(Email: whubbard@uga.edu), Tel: 706.542.7813

Abstract: Intergenerational land transfer, exurbanization, and large-scale land divestment by forest industry are a few of the reasons for why forestland is becoming increasingly parcelized and fragmented in the United States. At the same time, owners of these smaller parcels of fragmented forestland are facing increased challenges including increasing land values, higher taxes and fewer management options. Within the last 5 to 7 years, however, an innovative concept has surfaced that may provide opportunity for these forest landowners. This concept, known as ecosystem services, recognizes the social, economic, and environmental value of natural assets by putting a “market value” on them. The idea is that markets will arise for these services. Examples of possible markets include carbon, water, wetland, endangered and threatened species, and a host of others. This paper will explore and synthesize both the financial opportunities and barriers that may exist with regard to quantifying, valuing and marketing ecosystem services on small non-industrial forests (less than 100 acres) in the United States. In addition, this presentation will present information on the newly formed USDA Office of Ecosystem Markets and Services.

EFFECT OF EDUCATION ON THE ADOPTION OF WOODLAND MANAGEMENT

James E. Johnson¹, Maminaiina S. Rasamoelina, and R. Bruce Hull

109E Richardson Hall, College of Forestry, Oregon State University, Corvallis, OR 97333
¹Tel: 541-737-8954, Email: jim.johnson@oregonstate.edu

Abstract: Family forest owners are an important force in the forest sector in the U.S. The Nation's 10.4 million family forest owners collectively own 104 million ha, or about 35 percent of all forest land in the country. Accordingly, there have been many established programs to assist family forest owners with managing their lands to better provide both economic and ecosystem services to the public-at-large. We conducted a survey of 3,435 family forest owners in Virginia to determine the effect of voluntary educational programs, offered through the Cooperative Extension Service, on the adoption of a suite of woodland management practices. Respondents were classified as not having attended any educational programs, having attended minimal programs, or having attended short courses offered through the Virginia Forest Landowner Education Program (VFLEP), designed specifically to motivate landowners to adopt woodland management practices. Respondents not attending educational programs adopted at the rate of 75%, those attending minimal programs adopted at a rate of 83%, and VFLEP respondents adopted at a rate of 94%, a significant difference. In addition, 41% of VFLEP respondents had a written management plan, as compared to only 12% of those respondents who did not attend any educational programs.

UTILIZATION OF NON-TIMBER FOREST PRODUCTS IN BANGLADESH

Shiba P. Kar¹, and Michael Jacobson²

School of Forest Resources, 235 Forest Resources Building, Penn State University, University Park, PA 16802, U.S.A; ¹email: _spk175@psu.edu; ²email: mgj2@psu.edu, Tel: 814-865-4430

Abstract: The literature suggests that there is a strong relationship between non-timber forest products (NTFPs) and livelihoods of forest-adjacent communities. These forest resources have potential for meeting conservation and development objectives. The argument is that NTFPs can provide sufficient income and other livelihood benefits that reduce the need to convert forest to other uses. Very few studies in Bangladesh have looked at this issue. This study focused on villages in the Chittagong Hill Tracts of Bangladesh where this diverse NTFPs sector is overlooked and discounted in national level forestry programs. Field data were collected through participatory methods including in-person household and market surveys focusing on five types of NTFPs. Initial results show that although a large portion of the forest adjacent communities depend on these NTFPs for their livelihood, including subsistence income, there is lack of market knowledge and commercialization initiatives. Emerging issues include the need for small scale entrepreneurship development initiatives, better market access with information and support, and policy and land reforms.

FAMILY FOREST OWNERS UNDER THE SPOTLIGHT: THE FINNISH MONITORING SYSTEM.

Heimo Karppinen and Harri Hänninen

Dept. of Forest Economics, P.O. Box 27 Latokartanonkaari 7, FIN-00014 University of Helsinki, Finland (Email: heimo.karppinen@helsinki.fi), Tel: 358 9 191 57974

Abstract: The importance of non-industrial private forestry varies by country. From the perspective of forest policy, the overarching issues in family forests are roundwood production and timber supply, and maintenance of biodiversity. In the future, carbon sequestration, bioenergy production and recreation services will be in greater demand in private forests. Requirements for efficient monitoring of forest owners and their behavior are continuously increasing. This paper describes the Finnish monitoring system for private forestry.

The first significant step toward creating a permanent monitoring system for Finnish family forestry was taken in 1975, and it was followed by another study during 1980–86. The third round of data collection was conducted in 1990 followed by the latest country-wide survey in 1999. The next mail inquiry will take place in the beginning of 2009. The sampling frame is based on land registers. The survey data will be supplemented by information on forest owners' income, as well as holding and owner characteristics from land registers. Forest characteristics such as forest age distribution and timber volume are important for analyzing forest management behavior. Forest resource data will be acquired from Forestry Centers, which are regional extension units responsible for forest management planning. Also obligatory forest use declarations concerning commercial fellings will be available.

The forthcoming survey will be based on three subsamples using especially designed questionnaires. The basic items will be the same in each questionnaire type, enabling both countrywide and regionally representative estimates of family forest owners' demographic characteristics and behavior. In addition, follow-up studies utilizing the first round of data collection will be conducted. This arrangement will provide data for several research topics at the same time and serve the basic function - a comprehensive review of Finnish private forestry. The specific studies using subsample data and the follow-up studies concern policy means for voluntary biodiversity protection, forest owners' attitudes and intentions toward tending of young stands, interactive forest management planning, and factors affecting forest owners' timber sales decisions.

IT'S THE NETWORK: HOW PERSONAL RELATIONSHIPS SHAPE DECISIONS ABOUT PRIVATE FORESTS

David B. Kittredge¹, Mark G. Rickenbach, Angelica Erazo, and Emma Snellings

¹324 North Main Street, Petersham, Massachusetts 01366, USA. ¹Email: dbk@nrc.umass.edu
Tel: 978 724-3302.

Abstract: In many parts of the United States, roughly 40% of forest is in non-industrial, private ownership, and in much of the eastern US, as much as 75% of all forest is in this category. Nationally, surveys and participation rates suggest most owners do not participate in traditional management or technical assistance programs, nor do they obtain professional advice prior to a management decision such as the sale of timber. Based on this knowledge of what most landowners do not do, we posed a relatively simple research question: To whom do landowners turn when making decision about their lands?

We combined information search and processing theory and egocentric network analysis to begin understanding the role of others (i.e., alters) in landowner (i.e., ego) decision-making. We conducted structured interviews with 47 landowners who had made a significant management decision about their land in the last two years (i.e., timber harvested, or grant a conservation easement). Based on these data, we determined the extent of landowners' egocentric networks related to their land, and in particular to their decision, and evaluated each alters' role in the decision-making process. Furthermore, we determined the satisfaction these landowners had with their decision. Continued analysis will measure the relationships among satisfaction, landowner characteristics, and egocentric network characteristics.

Preliminary results indicate that there appear to be networks of people around woodland owners, and a subset thereof involved in a specific decision and its implementation. In addition, owners seemed more satisfied with the easement decision, than those who had made a timber sale decision, and, were more confident of the people involved in their easement decision, than those others involved in the timber sale decision. This is despite the fact that a conservation easement is a more serious and complicated legal, financial, and potentially intergenerational step compared with timber harvesting. Peer landowners and so-called 'locals' appear to be more significant sources of information in these landowner networks than relatives or neighbors.

Further work is needed to clarify the potential role of social networks in landowner decision making and their application in outreach methods to promote or assist in conservation, especially at spatial scales that exceed individual properties. Understanding social networks might suggest successful alternatives to connect owners with professionals. More study is needed to confirm these preliminary results, and further explore the knowledge transfer via these informal paths.

SEEING THE FORESTS FOR THE TOURISTS: EXAMINING NATURE-BASED TOURISM ON FAMILY FORESTS

Jessica Leahy and Brittany Hummel

219 Nutting Hall, School of Forest Resources, University of Maine, Orono, ME 04469 Tel: 207-581-2834, (email:jessica_leahy@umit.maine.edu).

Abstract: This presentation will discuss possibilities for forest-based entrepreneurial tourism enterprises (FBETE) on family forest lands in the Northern Forest Region (Maine, New Hampshire, Vermont, and New York). FBETEs are a specific type of micro-tourism enterprise or family-owned business in the nature-based tourism arena. We framed our research around the micro-tourism enterprise and family-owned business literature, which is a novel approach to understanding family forests. Semi-structured interviews were conducted with FBETE owners in the summer of 2007. Specific aims of our research were to assess the characteristics, motivations and goals of owners, to determine risks and challenges encountered in the business, to ascertain benefits obtained from the business, and to elucidate owner's views of success. The purpose of research was to gain a foundational understanding of these enterprises in order enlighten researchers, policy-makers, extension agents, forestry professionals, tourism planners, and potential FBETE owners.

FBETE owners were typically in their late 40s and were life-long residents of their respective states. The personality characteristics that were reported as being helpful in operating the businesses centered: drive, sociability, and innovativeness. Several motivations for starting an FBETE arose from this research. Prevalent motivations were personal interests or hobbies, a desire to share knowledge or experience, borrowed or creative visions, and to obtain a preferred lifestyle and reconnect with land. Commonly cited initial goals of FBETEs included to educate the public, to reconnect the public with nature, and to increase visitation to the business. Risks encountered at business start-up were typically related to financial issues. Challenges most frequently stated included competition, lack of community support, and insufficient training. Benefits that micro-tourism enterprise family forest landowners obtain have been notably overlooked in previous literature. Those often mentioned include customer appreciation, personal enjoyment and satisfaction, working at home, and meeting new people. Notably, all FBETE owners measured success through personal happiness and satisfaction. All FBETEs felt that they were success. Future goals for owners included improving the business and becoming sustainable.

Family forest landowners can face challenges in meeting their objectives, achieving their goals, and maintaining ownership. Recommendations from this study include increasing community support of FBETEs to assist in the stimulation of rural economies. Also, tourism planners can help FBETEs by marketing them on government tourism websites and by support rural entrepreneurial development policies. Extension agents and forestry professionals should offer courses on financial planning, technology, and marketing to FBETEs as well as developing an educational website.

AN OPPORTUNITY FOR SMALL-SCALE FORESTRY IN SOUTHERN ARAGUA STATE, VENEZUELA: PLANNING AND POLICY ISSUES.

Armando Torres Lezama¹, Emilio Vilanova, and Hirma Ramirez-Angulo

Grupo de Investigación BIODÉSUS, Instituto de Investigaciones para el Desarrollo Forestal INDEFOR, Conjunto Forestal, Universidad de Los Andes, vía Los Chorros de Milla, Merida, estado Merida, 5101, Venezuela. Tel: 58-274-2401507 (¹Email: torres@ula.ve)

Abstract: Proper governance, decentralization and landscape management have become emergent issues in the search for poverty alleviation and sustainable management of forest ecosystems. For a better understanding of these challenges, integrated approaches are urgently needed. According to this, small-scale forestry is considered in many countries as an option to provide goods and services that cannot be fulfilled through industrial and large-scale operations. In southern Aragua state, Venezuela, an area regarded as a high priority center for local and national development, through local knowledge, the use and production of wood-based goods has become a traditional socioeconomic activity for many years. Deforestation and strict protection policies for *Samanea saman*, ranked as a vulnerable tree species, have considerably increased wood prices and created a severe scarcity of wood, undermining traditional economic incomes for local communities.

Small-scale forestry is presented here as a new policy shift for forest management according to the new national forest legislation where local development is a central element for its implementation. Based on an integrated approach, biophysical, social and ecological issues have been taken into account using small-scale principles. Technological factors were also included to assess a broad group of species to be included in the analysis. A total of 54 sites, for a global area of approximately 32,000 ha (320 km²) are thought to be potentially capable to sustain a local development initiative for all five municipalities located in southern Aragua state. Spatial scale and distribution of sites is very variable in all cases. Several management scenarios are presented for selected species: *Samanea saman*, *Gmelina arborea*, *Acacia mangium*, *Tectona grandis*, among others. Agroforestry, farm and community forestry schemes are also suggested. Policies, actions and recommendations for a sustainable management include institutional strengthening, decentralization and the development of community-based forest enterprises. Additionally, ecosystem services should be adequately assessed in order to fully integrate a broader management planning where a monitoring program is essential to pursue an improvement in the preservation of poorly managed forest remnants. Finally, it is concluded that local livelihood can greatly improved and a new agenda for forest management can be possible when people becomes part of ecosystem management.

BRIDGING THE GAP BETWEEN PHYSICAL AND SOCIAL AVAILABILITY OF TIMBER: HOW MUCH WOOD IS REALLY AVAILABLE?

Zhao Ma¹ and Brett J. Butler

University of Massachusetts - Amherst, Department of Natural Resources Conservation, 160
Holdsworth Way, Amherst, MA 01003. Tel: 413-545-3966 ¹Email: zma@nrc.umass.edu

Abstract: As the population grows domestically and globally, so grows the need for wood products. There is an estimated 218 billion cubic feet of commercial trees in the forest of the 20 northern states. This estimated volume is located across various landscapes; the associated harvesting activities are influenced by various policies and programs; and 41% of the 218 billion cubic feet is owned by various non-industrial private forest owners, most of whom are families and individuals. Such conditions of the forest lead to an important question: how much timber in the 20 northern states is really available - both physically and socially? This paper intends to answer this question with a focus on family forests by 1) defining social availability of timber considering economic, societal, political, and human dimensions of forest management; 2) quantifying the social availability of timber in the 20 northern states and comparing it with the estimated physical timber availability; and 3) informing the development of forest policies and programs to maintain working forests, promote active forest management, and stem the decline of timber from family forests. The results will help state and local policy makers and agency officials, forest industries, community planners, landowner organizations, and natural resource professionals better understand current conditions and future trends of forest resources in the northern United States, balance the needs for wood products and for various ecosystem services provided by the forest, including carbon sequestration, watershed protection, scenic beauty and biodiversity conservation, and shed light on potential policy and program innovations to sustain domestic wood fiber supply and maximize forest ecosystem services and benefits.

PAYMENTS FOR FOREST BASED ECOSYSTEM SERVICES IN THE US

Evan Mercer¹, David Cooley, and Katherine Hamilton

PO Box 12254, Research Triangle Park, NC 27709, USA. Tel: 919-549-4095 ¹Email: emercer@fs.fed.us

Abstract: Payments for producing ecosystem services have recently been promoted as an important, evolving “market” for forestland owners and potential policy lever for “keeping forests in forest.” Over the last two decades, a variety of federal and state programs have applied a combination of regulations, extension services, and incentives to encourage private landowners to implement forest management, conservation, and restoration activities. Most of these programs have relied on payments from the government to landowners (usually in the form of cost-shares) to encourage specific types of land management. Although programs that subsidize tree planting for timber production in the US South have a long and successful history, programs specifically designed to enhance the production of ecosystem services such as water and air quality and biodiversity conservation are newer and their impacts uncertain. More recently, payments from additional sources have begun to emerge, including payments for forest carbon offsets, biodiversity conservation, and watershed management. In this paper, we use data collected for the USFS 2010 National Report on Forest Sustainability and data from the Ecosystem Marketplace report, “State of the Voluntary Carbon Markets” to produce an historical, statistical, and spatial analysis of the payments forest land owners receive from government agencies, non-government organizations, and private firms.

LEASING STATE FOREST LAND TO LOCAL PEOPLE IN BANGLADESH: DOES THE POLICY ENHANCE FOREST CONSERVATION AND IMPROVE RURAL LIVELIHOOD?

Tapan Kumar Nath and Makoto Inoue

Department of Global Agricultural Sciences, The University of Tokyo, 1-1-1 Yayoi, Bunkyo-ku, Tokyo 113-8657, Japan. Tel: 81-90-6502-7192 Email: tapankumarn@yahoo.com

Abstract: Forest management strategies in developing countries experienced a transition from state control to local management since 1970s. A number of local forest management approaches including social forestry, community forestry, and participatory forestry have been implemented. Forest policy of Bangladesh had also undergone changes to adopt a participatory forest management (PFM) strategy where local landless people were given degraded forest land (1-2 ha) for plantation development thereby improving their livelihood. This paper first describes a salient feature of the transition of forest policy towards a PFM, and then drawing a number of case studies from two PFM programs it shows how leasing of state forest land to local landless people enhances forest conservation and at the same time improves local people's livelihood.

Since the British colonial period, four national forest policies have been enacted in Bangladesh. Except current forest policy of 1994, none of them gave emphasis on involvement of local people on development and conservation of forest resources. However, due to pressure from donor agencies to involve local people in forest management leasing of forest land to local landless people under social forestry programs started in the country during early 1980s. Since then a number of PFM programs had been implemented. Empirical studies in two such programs reveal that forest areas in program sites has increased, people's participation in forest management activities has augmented and livelihood of participant villagers has enhanced. Due to disparity in forest production technologies, lack of people's awareness, inability of staff members to motivate people and lack of accountability and transparency program's outcomes varied in different sites. Recommendations that ensure effective participation of local people in program's functions, implementation of locally adopted and beneficial forest production technologies, and execution of good governance in managing program' activities are suggested.

EDUCATING FAMILY FOREST LANDOWNERS ABOUT CULTURAL RESOURCES

Andrew B. Perleberg¹, James Freed, and David Baumgartner

¹400 Washington Street, Wenatchee, WA 98801, USA. Tel: 509-667-6540. Email: andyp@wsu.edu

Abstract: 150,000 families control at least 5.1 million acres of forestland in Washington. Their management objectives are diverse and generally they value their land for many reasons. One objective they have in common is their desire to protect the resources they steward for their own benefit and for society. Some of the least understood resources landowners manage are cultural resources. Cultural resources are broadly defined and contain examples of both physical assets such as old buildings, religious sites, and Native American artifacts and intangible culture such as storytelling, folklore, and drama. Cultural resources help us define our history, understand how cultures change, and provide insight for contemporary management of our lands and the environment. Ignorance of cultural resource identification and protection measures puts these resources in jeopardy of being destroyed and forever lost. But where do forest owners go for cultural resource information? Recently, they have been looking to extension foresters from Washington State University. Through a variety of educational efforts and collaboration, the WSU Extension forestry team has engaged forest-owning families, and those who work with them, in learning events which has increased the knowledge and identification skills in cultural resources. Protection of sites and objects of cultural significance has improved as a result of these endeavors.

ON IMPROVING THE TRIPLE BOTTOM LINE RETURNS: THE SAFEST (SUSTAINABLE AGRO-FORESTRY ECOLOGICAL FARMING ENTERPRISE, SCIENCE AND TECHNOLOGY PROJECT) WAY

Florence Z. Tarun-Acay

College of Forestry and Environmental Management, Isabela State University, Cabagan, Isabela, Philippines. Cell phone: +63-919-271-4514, Email: acay_leztarun@yahoo.com

The SAFEST project is the CFEM's "ride-on" project with the 5-year Department of Agriculture-Bureau of Agricultural Research (DA-BAR) funded project of the Upland Resource Development Center with the overall aim to demonstrate the acceptability, viability and adoptability of some ecological farming systems (organic, natural and conservation farming) that can address upland farm households' concern for production of "safe" food and cash under "safe" agroecosystems on a sustainable basis.

It is perceived to be in response to the calls of the following:

- *The Kyoto Protocol: Reduction of Emission from Deforestation in Developing Countries (REDD) and Land-use, Land-use Change and Forestry Activities (LULUCF);*
- *United Nations' Millennium Development Goals;*
- *The Philippine Strategy for Sustainable Development (PSSD)*
- *Order 481 of 2005, entitled "Promotion and Development of Organic Agriculture in the Philippines;" and other environmental laws of the Government of the Philippines*

In each of the six 1-hectare mango-based crop-livestock integrated farm in marginal or sub-marginal farm land, the observable triple bottom-line returns include mostly of the following: 1) the socio-cultural aspect: transformation from subsistence farmers to business farmers, shift from unsustainable to sustainable practices, individual health being freed from exposure to disease-carrier animal manures, food safe from side effects of inorganic fertilizer, variety of nutritious food/feeds, a shift from major to minor construction materials, a variety of nutritious food/feeds, safe food from inorganically grown crops to organic varieties, safe potable water/farm irrigation water needs, and access to social services through road construction; 2) the economic aspect: transformation from consumerism and subsistence farming to entrepreneurship, increased income from crop-animal production, lower cost of inputs, income from conversion of agri-wastes and/or lesser-used resources into useful culture media and bio-organic fertilizer (BOF), increased soil productivity, increased effective land area, increased effective rainfall, efficient/effective production system, and, access to business/ finance/ marketing services; and 3) the ecological aspect: transformation from unsustainable/ conventional agriculture to sustainable agriculture, reduction of serious nutrient use imbalance, environmental health with agroecosystems *safe* from toxic chemical residues, solid waste management system, reduced CO₂ from burning, reduced CH₄ from decomposition, reduced emission from deforestation, carbon sequestration, reduced soil erosion/ landslide, and biotic balance and/or integrated pest management system.

EXTENT OF FORESTRY PRACTICES IN A FEDERAL COST SHARE PROGRAM IN WEST VIRGINIA, USA

Elizabeth Tichner, David W. McGill, William Grafton, and Jennifer Steele

West Virginia University, Division of Forestry and Natural Resources, Morgantown, WV 26505, USA. Tel: 304 282 4064, Email: etichner@mix.wvu.edu

Abstract: Because West Virginia has such a high percentage of forestlands that are owned by private individuals, providing these landowners with technical assistance and aid managing their forests is important to secure the sustainable future of the state's forests. The Forest Stewardship Program (FSP) and associated cost-share programs have been available to NIPF owners since their establishment by the Farm Bill of 1990. This program provides cost-share dollars to help landowners create a management plan with a certified forester to meet the goals they have for their land. By having a management plan, enrollees are eligible for cost-share dollars through federal programs to implement various practices recommended in their plan.

The effectiveness of the Forest Stewardship Program in West Virginia depends on the extent to which landowners follow their plans and practice sustainable forestry. In 2003, Jennings surveyed participants in the WV FSP about the status of implementation of recommended practices. For each of the 10 practices surveyed, respondents were asked if the practice had been applied 'somewhat', 'almost', and 'fully' according to its recommendation. He also sought to understand factors that influence the application of management practices. Jennings found that the highest implemented practices recommended on participants' stewardship plan were wildlife habitat improvement (78%), stand improvement (74%), improvement of recreation opportunities (71%), and soil protection (71%). All recommended practices in question were reported to be implemented at least 50 percent of the time. He also found that several factors related to whether a practice was carried out by the land owner. The most often reported significant factor in determining practice implementation was its recommendation on the landowner's stewardship plan. Other significant factors in determining whether a practice was implemented were whether the respondent felt certain that the plan would meet their objects and how often they referred to their plan.

Using a subsample of FSP participants, a telephone survey was conducted in 2005 to ask respondents about the recommendation of ten management practices and the acreage that these practices were carried out. Respondents were also asked if these practices were conducted with the aid of cost-share programs. Aside from understanding of the acreage to which recommended practices are implemented and what practices are being implemented using cost-share dollars, this study also seeks to determine differences in responses given by participants in these two surveys as to which recommended practices have been applied.

MADE IN THE SHADE: NONTIMBER FOREST PRODUCT SOCIAL AND KNOWLEDGE NETWORKS

David Wilsey and Julie Meidtke

University of Minnesota Extension, Cloquet Regional Office, 179 University Road, Cloquet, MN 55720 Tel: 218-726-6461, Email: dwilsey@umn.edu

Abstract: Nontimber forest products (NTFPs) are the proverbial elephant in the woods. They are defined subordinately, by what they are not. Forest managers sometimes ignore them. One is unlikely to get rich harvesting NTFPs, and even established enterprises are consistently hamstrung by uneven supply quality and quantity. NTFP activities are typically diffuse and invisible, and hence, undervalued. It would be a mistake, however, to equate lack of attention with lack of importance. More likely, inattention relates to the challenge of understanding a diverse suite of products, for which uses and motivations for use are also diverse. Indeed, this multi-faceted diversity is the core value of NTFPs.

Consider the implications of a holistic approach to NTFPs for natural resource education, the environment, and local economies. NTFPs are diverse. They provide exposure to the whole: canopy and understory, roots, shoots, seeds and fruits. They are of boreal, temperate, and tropical forests. Local, national, and international NTFP users all share a frame of reference, even when the products and forests differ. NTFPs are used diversely. In this way, a local resource has potential appeal to multiple subsets of the general population: rural and urban, native communities, and immigrants. NTFPs activity is diversely motivated. Harvest can be economically driven, as an economic safety net, an income-smoothing mechanism, or a full-scale enterprise. It can be cultural and spiritual. NTFPs also provide a source of outdoor recreation. With NTFPs, forest managers have the potential to draw interest from local and global communities. Similarly, the reach of local NTFPs can be extensive. All harvesters, intermediaries, and end-users are stakeholders, and thus potential beneficiaries and supporters of local forest policy.

Made in the Shade is a new effort coordinated by a team from University of Minnesota Extension. Its goals are:

- *Increased awareness of nontimber forest products and resources*
- *Exchange of nontimber traditions, experiences, and information*
- *Development of a network for nontimber appreciators, users, educators, and entrepreneurs.*

Our approach draws from traditional and emerging technologies, seeking a balance appropriate to our user base. Thus, Made in the Shade fosters the creation of a two networks: an NTFP harvester/user network and a related, virtual knowledge network. Working together these will increase the visibility of NTFP activity, permit real and virtual interaction, and serve as a platform for education and natural resource based economic development. Our paper details the Made in the Shade concept, the approach taken, expected outcomes, and early results.

