Advances and Challenges in Managerial Economics and Accounting

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9-11 May 2016
Vienna, Austria

Proceedings

IUFRO Unit 4.05.00 – Managerial economics and accounting

4.05.01 - Managerial, social and environmental accounting
4.05.02 - Managerial economics
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Local Organizer:

Institute of Agricultural and Forestry Economics,
Department of Economics and Social Sciences,
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Preface

Forests contribute to modern societies through cultural, economic, environmental, institutional and social dimensions. Forest management decisions and practices, therefore, must incorporate information concerning all of these dimensions. In addition, global issues such as changes in society, climate and forest values influence and transform the ways in which forest ecosystems are perceived, managed and used. The role of managerial economics and accounting in forest ecosystems management and policy development in response to these evolving conditions and needs of society were in the focus of the symposium on 'Advances and Challenges in Managerial Economics and Accounting' which took place in Vienna, May 9 – 11, 2016. The contributions, stemming from different regions across the globe, provide an insight into recent and upcoming issues in managerial economics and accounting related to forestry.

The symposium was organized according to the tradition of IUFRO-Unit 4.05.00 - Managerial economics and accounting as a joint event of its sub-units: 4.05.01 - Managerial, social and environmental accounting, 4.05.02 - Managerial economics and 4.05.03 - Managerial economics and accounting in Latin America.

The volume comprises all the papers submitted and accepted for presentation at the conference. All submissions were subject to a two-stage peer-review process on behalf of the program committee. The proceedings are to contribute to theme 3 of the IUFRO-strategy: 'forests and forest products for a greener future'.

Editors:

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Contents

Communicating the value of nature services today for tomorrow

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Keywords: *ecosystem services, communication, forests, society, forest values, multi-stakeholder approach*

Introduction

To ensure that the real value of nature services, including ecosystem services, is adequately appreciated, they must be presented to the public in an appropriate way. Humans are usually not willing to pay for something they take for granted today and is considered as 'free goods' (Coull and Valantin, 2008). The challenge is changing the mind-set through awareness-raising. A good communication strategy should convey the message as a tangible concern that contributes to the quality of our lives and the lives of our children (*IUCN Regional Office for Pan-Europe*). Communicating nature's services will help the younger generation to understand the benefits we gain from ecosystem services and joy and pleasure they can give us if we treat them with knowledge, respect and wisdom. (Wiborn, 2013)

The actions that have been taken in the past are not giving the results we need. Hohnen (2001) suggests that we should work together to find the right path forward. A multi-stakeholder approach can engage and harness the creativity from wide and balanced cross-section of stakeholders through solution driven dialogue (*Ibid.*).

"Learning to engage in dialogue means to move from hearing to listening. It means taking one step beyond fighting, beyond adversarial, conflict-based interaction… Dialogue is the foundation for finding consensus solutions which integrate diverse views and generate the necessary commitment to implementation. It can form the basis to take us one step beyond talking towards common action" (Hemmati, *et al.* 2002.).

Hemmanti *et al.* (2002) view communication as a tool to exchange views (opinions) among stakeholders in an MSP. It includes the expression of views in combination with the understanding of views to the point of mutual understanding (*Ibid.*).

In the LIFEGENMON project[1], coordinated by Slovenian Forestry Institute, the multi-stakeholder approach is used to communicate the forest related nature services in connection to the 360 degree brand communication. A clear visual and verbal communication creates maximum awareness and brings the key project messages to life. 360-degree brand communications means showcasing the use of compelling and targeted messages, both online and offline, in an effort to forge meaningful connections with core stakeholders. Ultimately, the results will demonstrate the value of engaging supporters and champions in co-creating communications to extend reach and impact (Darigan Meranda, 2013).

Method of implementation

The communication strategy of the LIFEGENMON project is carried out in two focused tasks. General dissemination and communication addresses the following stakeholders:

- Kindergarten children
- Pupils in primary and secondary schools
- Students at Universities
- Socially active groups (different for each country)
- Media

In task Targeted dissemination and communication the most important groups of stakeholders have been identified through dialogue between project partners:

- **Policy makers** – key actors (the ones to convince) in the legislative process on a local, regional and European scale.
- **Municipalities within the region** – local authorities can give necessary promotion and credibility needed for the maximisation of dissemination impact. They are also very appropriate partners for spreading information to target areas.
- **Active groups** (ASP – Women organisation; third university for everlasting education, recreational sports associations and others) – through "spreading the good word", socially active groups can increase the dissemination impact if addressed appropriately.
- **Academic audience** – academics are often opinion makers, e.g. what they say usually resonates in public and professional space.
- **Chamber of Commerce** – the Chamber of Commerce is an important player in the

1 Life for Forest Genetic Monitoring System; http://www.lifegenmon.si/about/

legislation department. It is very important to include big business in our dissemination strategy, because no legislation or regulation get passed without their influence. We need to raise their awareness of the importance of our main dissemination strategy topics.

- **Professional Chambers** – smaller, but more specific legislation and regulation impact. Also a base of professional experience. We also need to raise their awareness of the importance of our main dissemination strategy topics.
- **NGOs** (such as professional associations, mountaineering organisations, scouts, hunters associations, climbers association, UMANOTERA – SI, WWF, Birdlife and others) – NGOs are well heard opinion makers among the urban population and are traditionally inclined to support the topics of our dissemination strategy. Very important players in any legislation process if activated.
- **Forest owners** – forest owners are the ones that do (or at least approve) the majority of the actual work done in the focus area. It is aim to reach them with the conservational aspects of our dissemination strategy.
- **Unions of forest workers** – they need to be addressed to spread the information on genetic forest protection and the future of European forests based on genetic diversity.
- **Civil protection service and volunteers** – they are first to be activated at any major disaster events in the areas, due to extreme weather conditions or un-appropriate forest managing. Their activities are well visible in the public and can spread the word on the need for sustainable forest management and an early warning system for changes in forest populations.
- **Tourist organisations** – sustainable and eco- tourism is becoming very popular. They are also traditionally inclined to support the topics of our dissemination strategy and reach a wide audience with their marketing so it makes sense to include them in our dissemination activities.

Carrying out communication activities goes beyond the narrow scope of the project to reach the highest impact through:

- Connecting (in Slovenia cooperation with Slovenia Forest Service, University of Ljubljana – Biotechnical Faculty, Slovenian Academy of sciences and arts, etc.; participation at and organisation of events and conferences, trade fairs, media events etc.)
- Dialogue (organisation of Workshops, receiving and evaluating feedback)

All activities are supported by media presence, web updates (Facebook, Twitter, LinkedIn, project web-site) and publications (newsletters, leaflets, teaching materials for teachers etc.).

Monitoring methods and Results

The impact of the activities will be monitored through lists of participants and an advanced monitoring matrix, based on questionnaires and interviews of participants at project's events. The monitoring is carried out by an internal project monitoring team, project partner Centre for information service, co-operation and development of NGOs.

The LIFEGENMON team has by November 2015 reached 2400 people on 70 different events and LIFEGENMON website has had over 4000 users who have clicked on 14.600 pages (Source: LIFEGENMON website statistics). Intermediate results of activities are shown in the figure below.

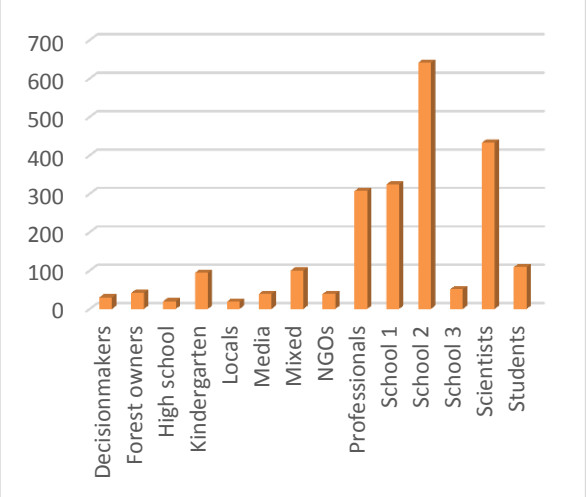

Figure 1: Participants at LIFEGENMON events per target group from July 2014 – November 2015

Results and progress of implementation will be presented in LIFEGENMON progress reports and scientific and professional articles.

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Economic and accounting costs in wood production: effects on commercialization and profitability of forestry producers

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Keywords: *economic costs, accounting costs, wood production, forestry producers*

Introduction

The forest sector as well as other productive sectors aims to produce or provide services for the benefit of social welfare. However, to achieve these objectives it is necessary to generate positive economic result - profit or surplus. Thus, control of production costs is important in setting a goal of profit, since the selling price is in most cases determined by the market. The production cost analysis is crucial in decision-making, and help to measure the degree of competitiveness in relation to other companies in the market. Production costs consist of explicit and implicit costs. In accounting, the costs are recorded from an actual disbursement, called explicit costs. Within the economy, in addition to the disbursement costs, there is the opportunity cost that does not necessarily involve disbursement. In other words, financial analysis deals with "visible" money transactions while economic analysis may include the "unseen" contributions of the activity to the human satisfaction or welfare. Therefore, in an analysis of production costs, accounting costs present a differentiation in relation to the economic costs, which leads the accounting profit have a greater value than economic profit. This research looks to assess the impact of the cost of standing wood calculation, using economic and accounting standards.

Material and Method

To calculate and analyse the costs, data from an annual cash flow of Eucalyptus spp plantation were used. At first the economic costs of standing wood were estimated taking into account whether or not the opportunity cost of the land. The analysis also included the maintenance effects of the biome as legal environmental conservation. In the second part of the study, the calculation of the standing wood costs, was obtained through the use of the most commonly adopted accounting techniques by forestry companies. In the calculation process through these techniques, there is no inclusion of opportunity costs nor preservation costs of biomes.

Results

Through the data of cash flow, we calculated the timber production costs of a 14 years rotation. The amounts accrued and capitalized to a 6% rate of eucalyptus production costs can be seen in Table 1.

Table 1: Cost evaluation of a Eucalyptus plantation.

Year	$/ha/year	$/ha/year Cumulative	$/ha/year Capitalized (6%)
0	406.53	406.53	406.53
1	74.52	481.05	505.44
2	51.39	532.44	587.16
3	51.39	583.83	673.77
4	23.13	606.95	737.33
5	15.42	622.37	796.99
6	15.42	637.79	860.23
7	57.80	695.59	969.64
8	42.38	737.97	1,070.19
9	42.38	780.35	1,176.78
10	23.13	803.48	1,270.52
11	15.42	818.89	1,362.17
12	15.42	834.31	1,459.32
13	15.42	849.73	1,562.30
14	30.84	880.57	1,686.88

Different scenarios for the comparison between the economic and accounting costs were defined. (See Tab. 2). The final cost values in different scenarios are presented in dollars per cubic meter. (See Tab. 3).

Table 2: Differentiation cost calculation.

A	capitalized (6% per year)
B	capitalized (6%) + opportunity cost of the land
C	capitalized (6%) + opportunity cost of the land + environmental costs
D	accounting cost

Table 3: Cost values ($/m³) in different scenarios.

	$/m³
A	3.24
B	6.57
C	9.01
D	2.52

When comparing the costs calculated in the economic base with the accounting basis it is clear that there is a significant difference between the inclusion of land opportunity cost and environmental costs. Without these factors, Scenario A shows a small difference regarding the scenario D.

Discussion

There is a differential gap in income costs, showing that in the economic process the value of the wood is higher than the accounting value (See Tab. 3); the cost of land and compulsory preservation of the biome, also impact the economic costs, however there are little or no effects on accounting costs. It sets up a delicate situation for small and medium forest producers. In general, the forestry wood market is not competitive. Buyers are oligopolistic and producers are close to a perfect competition. The market price does not reflect an adequate remuneration for timber-producing. The production cost analysis provides a major contribution to the producer in order to support trading decisions, and an improvement of the products and services. Consequently improving the management and distribution of their costs and strengthening its market position. To bring benefits to the forestry market and the society could be organized cooperatives of producers, spread production costs, and establish formal relations between producers and forestry companies.

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What can physical input-output analysis tell us about the costs of alternative forest management scenarios in Germany?

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Keywords: *physical input-output analysis, forest-based industries, Germany*

Introduction

Rising concerns about the threat of global climate change have brought considerable attention to the mitigation potential of forests and forest-derived products (Schelhaas et al., 2007). In countries such as Germany, where forests cover more than one third of total land area, silviculture plays an important role in the national carbon balance. Numerous studies and reports have estimated the cost-effectiveness of forestry options, such as afforestation/reforestation, changing of rotation lengths or protection of forests (e.g. Richards and Stokes, 2004). However, most previous cost studies have focused at the enterprise rather than the national level; moreover, many of these studies have either applied a selective understanding of the forestry options' quantitative effects or selective cost conceptions. Hence, still today, it is a big challenge to fully understand how different forest management strategies can best contribute to climate change mitigation and how high the associated costs are.

The main objective of this study is to estimate the costs of selected technical and management-based mitigation measures in forestry through the consistency of input-output analysis. To achieve the objective of the study, different input-output methodological concepts are combined and applied in a relatively novel fashion. A physical input-output table (PIOT) that shows the wood-based fiber flow through the economic system of Germany forms the core of the model. Many mitigation policies lead to shortages in flows of roundwood to the economic system. These contracting effects visible in the PIOT are then linearly transferred to figures on value added of the different sectors. Finally, the costs of the mitigation measures can be estimated as the aggregate of the value added losses in the relevant markets.

Material and Method

The conventional physical input-output analysis (e.g. Strassert, 2001; Hubacek and Giljum, 2003; Weisz and Duchin, 2006) has to be adapted to our purposes. Essentially, our alternative approach is made operational by changing input and output axes. Generally, a physical input-output table is a tabular system where *n* sectors (or industries) are described by both their material inputs and outputs in physical units. In our case, the outputs are disaggregated by destination categories in the columns and the inputs are disaggregated by origin categories in the rows.

For the physical input-output table, the wood fiber equivalent as defined by Weimar (2011) is used as reference unit. The wood fiber equivalent (abbreviated m³ (f)) is a volume unit which is defined as the equivalent volume of the wood fibers or wood-based fibers at the fiber saturation point that are contained in the product.

Different statistics published by the Federal Statistical Office of Germany served as the main source of information for the construction of the PIOT: the production statistics (StBA, 2010b) for information on produced quantities, the foreign trade statistics (StBA, 2010a) for information on imported and exported quantities and the wood working statistics (StBA, 2010c) for information on stock changes of the wood processing industry. Quantitative information in these official statistics is provided in different units such as metric tons and cubic meters. Therefore, a conversion to the reference unit was necessary.

Some relevant aspects, however, are not (or only partly) covered by the statistics of the Federal Statistical Office. Here, additional data was used. Data on gross value added of the different industries of the forest-based sector are taken from Becher (2014) and Bösch et al. (2015a).

Table 1: Overview of timber harvests under the alternative forest management scenarios (in million m³ under bark per year).

	2014-2018	2019-2023	2024-2028	2029-2033	2034-2038	2039-2043
0	80.77	82.81	79.23	81.72	78.51	76.27
I	67.97	70.28	71.07	70.36	73.43	74.76
II	96.32	94.89	93.72	89.71	86.01	76.27
III	78.30	80.27	76.81	79.22	76.11	73.93
IV	72.53	74.36	71.14	73.38	70.50	68.49

The effects of different timber-cutting regimes in Germany are analyzed by comparing five scenarios, each referring to an alternative level of wood harvests. The analysis is conducted as a comparison between the base scenario (Scenario 0) and each of the other four scenarios in turn (see Table 1). The year 2048 is chosen as the ultimate time horizon in order to assess at least part of the long-term effects, starting point is the year 2014.

Scenarios 0, I and II were originally developed by the Thünen Institute of Forest Ecosystems within the so-called Forest Development and Timber Resource Modeling (WEHAM) framework and were based on the second National Forest Inventory. Scenario 0 represents the current economic and legislative framework of German forest management in 2002 and its expected development, taking market conditions, legal requirements as well as owners' objectives of forest management into account. This base scenario was of particular significance because it was used to construct the so-called Forest Management Reference Level (FMRL) for the second commitment period of the Kyoto Protocol (Krug et al., 2011).

Changing the rotation length of tree stands is an effective way to manage the carbon budget of forests. Increasing/decreasing the rotation length usually leads to a larger/smaller carbon stock in forests (Schelhaas et al., 2007). Scenarios I and II were included to reflect the outcomes of varying rotation periods; the respective forest management scenarios were calculated with WEHAM. In Scenario I, the final exploitation is postponed by 20 years compared to the base scenario (technically speaking, the diameter threshold for harvesting is increased by 10 cm). On the other hand, scenario II describes the potential roundwood availability which will be given when growing stocks are reduced (starting in 2002) to the level which was observed in 1987 (the base year of the first NFI). Accordingly, rotation lengths are decreased so that the growing stock in the year 2022 will be reduced to the level of 1987; this corresponds to a decrease of the average rotation period of about 17 years (Krug et al., 2009).

Usually, abandoning silvicultural measures and harvests increases the carbon stock in the living and dead biomasss (Janisch and Harmon, 2002; Luyssaert et al., 2008). Scenarios III and IV represent the effects of such a protection of forests and the corresponding reduction in harvest volumes. Scenario III is based on the goal of the National Biodiversity Strategy (BMU, 2007), namely to reach a five percent share of forest area set aside. In 2008, about 2 percent of the forest area of Germany was located in e.g. nature conservation areas where harvest was forbidden. It was assumed that this share increased to 5 percent until 2014. In Scenario IV, this approach was replaced with the assumption of a 10 percent reduction in timber harvest across all species and age classes in addition to the existing areas without management. Therefore, the reduction in harvest potential is larger than simply doubling the reductions of scenario III.

Results

Table 2: Financial costs of the different forest management scenarios (in million Euros per year; negative values indicate benefits).

	2014-2018	2019-2023	2024-2028	2029-2033	2034-2038	2039-2043
I	2591	2536	1652	2299	1028	306
II	-3147	-2445	-2933	-1617	-1518	0
III	500	514	490	506	486	474
IV	1668	1710	1637	1688	1621	1575

The financial costs of the four alternative timber-cutting strategies are presented in Table 2. In Scenario I (increasing rotation lengths), the valued added of the forest cluster will decrease by a total of 2.6 billion Euros per year in the period 2014-2018. In Scenarios III and IV (protection scenarios), the respective decrease in value added will amount to 0.5 billion Euros and 1.7 billion Euros per year in the period 2014-2018. In Scenario II (decreasing rotation lengths), value added will not decrease, but increase by 3.1 billion, indicating benefits rather than costs. However, it can be seen from Table 2 that after the year 2039, also Scenario II will generate positive costs. Of the total change in value added, the change within the construction industry will account for approximately 38 percent, the change within the furniture industry for 15 percent and the change within forestry for about 14 percent.

Discussion

It seems obvious that the quality of the results presented in this study depends primarily on the quality of the underlying data sources. The model calculations are largely based on official statistics published by the Federal Statistical Office of Germany. However, some uncertainties are introduced whenever quantitative information is converted to the reference unit wood fiber equivalent, simply because the properties of the different wood-based products (e.g. densities, mass of glue) are in most cases based on expert judgment. Other uncertainties are introduced when bringing physical and monetary units together, i.e.

when converting physical changes into changes in value added. The interaction between the ecological and the economic system is complex; our assumption of a linear relationship between roundwood supply and value added is therefore a simplification.

Central to the application of input-output analysis in this study is the assumption that inputs such as roundwood are used in fixed proportions, i.e. substitution among inputs is not considered. The corresponding production function is called the Leontief function (e.g. Miller and Blair, 2009). However, an economic sector usually chooses the optimal combination of inputs according to the relative input prices and the technological constraints. For instance, if an industry can use either wood or plastic for production and a timber-cutting strategy modifies the relative prices of these commodities, there might be a shift from the use of one input (for example roundwood) to the other (for example thermoplastics). Therefore, the use of a Leontief function in the present study probably has led to an overestimation of the costs, as the opportunity for an industry to alter the input mix moderates the cost effect of the timber-cutting scenarios. Hence, the cost estimates of this investigation should be considered as an upper bound estimation. In this regard, a computable general equilibrium (CGE) model is often considered a better alternative than the input-output model, as it allows for evaluating the substitution effects. However, the construction of a CGE model was clearly beyond the resources of the present study.

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Harmonization of Slovak Republic Accounting System in the Context of IAS 41

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Keywords: *harmonization, accounting standards, IAS 41, forest enterprises*

Introduction

In 1973, the International Accounting Standards Committee (IASC) was created as the result of an agreement between the professional accounting organizations of a number of countries. The declared idea of accounting harmonization retreated from accounting procedures unification and the creation of uniform chart of accounts. The basic principles that guided the committee were focused on reporting the effects of accounting transactions on the financial situation and company´s performance. IASC accounting standards created in the period of 1975-2002 were published under the name of International Accounting Standards (IAS).

The European Union in the 1990s began to realize the need for harmonization of accounting rules. However, it could neither use the existing European Directives (based on the large amount of permissible alternative accounting procedures), nor national regulations of other countries (eg. US GAAP), since such a decision would limit EU institutions actions in the case that these rules are contrary to their interests. The result was the decision that if the IASC was to achieve the declared EU objectives, the EU would consider the use of International Accounting Standards (IAS) for the preparation of financial statements in its Member States (Tumpach, 2006).

The legislative framework for the application of international accounting standards is a common regulation of the European Parliament and Council Regulation (EC) no.1606 / 2002 of 19 July 2002 on the application of international accounting standards. Regulation states that its purpose is to contribute to the cost-effective functioning of capital markets. Protecting investors and maintaining confidence in financial markets is also important.

Commission Regulation (EC) No. 1725/2003 of 29 September 2003, adopted certain international standards and interpretations on 14 September 2002 that were extant. In the following years, there have been several amendments to each accepted standards. For this reason, Commission Regulation (EC) No. 1126/2008, containing the text of all existing applicable accounting standards was enacted.

The Slovak Republic is part of the ongoing globalization processes in the EU and worldwide. Its current economy is characterized as open with high foreign investments. Several major companies are using foreign capital, which makes the need for unification, and thus clarification of economic information as accounting outputs even more critical.

The aim of this paper is to analyse the process of Slovak financial legislation harmonization with international accounting practices and its impact on forest enterprises.

Material and Method

We used document analysis in order to analyse the impact of Slovak legislation harmonization with IAS. The following documents were analysed:

- Act no. 431/2002 of the Coll. on accounting and its amendments
- IAS

The impact of the IAS on forest enterprises was examined as well.

Results

An important step in the approximation of Slovak legislation with EU law (the Fourth and Seventh Council Directive of the European Community), creating the conditions for the application of IAS / IFRS, was the adoption of Act. No. 431/2002 of the Coll. on accounting. The law contains for the first time definitions of basic terms used in accounting requirements based on IAS / IFRS, adjusted to meet the demands of accounting entities in Slovakia. For the first time a space for the use of IAS or other accepted accounting principles for the preparation of consolidated financial statements.

On 9 September 2004 the National Council adopted an amendment to the act on accounting which came into effect on the 1st January 2005. The act introduced for the first time that certain accounting entities are obliged to compile individual financial statements in accordance with International Financial Reporting Standards. These

are financial institutions, commercial insurance companies, reinsurance companies, Slovak insurers' office, pension fund management companies, supplementary pension companies, securities brokers, stock exchange and "big accounting units". Big accounting units are those who meet at least two of following requirements in at least two consecutive accounting periods (Act no. 561/2004 of the Coll.):

- The total amount of assets exceeded 165 969 594,40 €, where the amount of assets is present in the balance sheet in valuation not adjusted by items according to § 26 (3).
- Net sales exceeded 165 969 594,40 €.
- Average recalculated number of employees in one accounting period exceeded 2 000.

Such individual financial statement had to be elaborated for the first time in the accounting period beginning on 1st January 2006.

Another important "harmonization" amendment to the Act on Accounting is Act no. 198/2007 of the Coll. Most of the provisions of the amendment came into force on 1 January 2008. In relation to the accounting entities obliged to prepare individual financial statements according to IAS / IFRS, there was only the extension to Slovak Railways.

Several standards apply regarding IAS / IFRS for forestry (e.g., IAS 16 in the case of property, IAS 38 for intangible assets, IAS 20, in the case of state subsidies). However, the dominant position is occupied by IAS 41 Agriculture. Standard IAS 41 Agriculture introduces real value valuation in forest enterprises. By this value biological assets are valued at first recording and subsequently always at the date of financial statement elaboration. Real value is reduced by the estimated costs of sale (selling costs). Selling costs can include commissions, fees, transfer tax and duties. They cannot include financial cost and income tax. As a basis for real value estimation the standard enables to use:

- quoted price on active market – commodity and crop stock market (priority),
- last transaction price, if there have not been rapid economic changes,
- market prices of similar assets,
- sectoral criteria,
- present value of expected net cash flow discounted at the current market rate – in the case no market price or value exists
- cost price – in exceptional, specific cases (eg. forest stand after 2 years of foundation).

The applied method of biological assets valuation subsequently affects the way the disclosure of the enterprises´ financial condition and changes in the notes.

Discussion

The process of harmonization simplifies accounting procedures for a wide range of accounting entities. The harmonization of accounting becomes a tool which can achieve cross-country comparability of financial statements in transnational terms. With the accession of the Slovak Republic to the European Union, the country assumed a number of commitments related to the implementation of European law. One of them is the gradual harmonization of accounting. This is carried out by various amendments to the Act on Accounting, which brought national accounting standards closer to international accounting standards IAS / IFRS. However, the problem remains in the access to the accounting system, which can be characterized as government driven and tax dominated. As Forst (2014) states, Slovakia can be integrated into IFRS integrated group, which have greatly expanded the use of IFRS beyond the limited mandate of the IAS Regulation.

In connection with the application of international accounting standards IAS / IFRS in terms of forest management, the most important is IAS 41 Agriculture. The most significant change, the standard provides is the application of real value in the valuation of so called biologic assets. Real value valuation seems to be a major barrier to the application of IAS 41 Agriculture in practice of Slovak forest enterprises.

The IAS/IFRS can be presumably applied by the biggest forest enterprise in Slovakia, which is the Forests of the Slovak Republic, state enterprise. The state forest enterprise is the biggest forest land management company, in 2014 they managed 44,59% of the total forest cover in Slovakia and their share on the wood market was 50,8%.

At present the accounting legislation stipulated in the Act no. 431/2002 of the Coll. applies most of the important procedures defined by IAS/IFRS. Compared to the currently applied procedure of company´s assets disclosure, the change is that the value of forests is taken into account as the biological asset of the company. Applicable accounting legislation only requires valuation of forest land as a part of the fixed assets. The valuation of forest stands for accounting purposes is not being performed. The growing stock of

wood is recognized in the balance sheet only after logging and only during the storage period.

When applying the provisions of IAS / IFRS standards at Forest Enterprises, following major problems can be identified in Slovakia:

- Forest land owned by the state cannot be sold and cannot be subject of hedging. The guarantee of future economic benefits is therefore limited because this asset cannot be exchanged for other property, it cannot be accepted by creditors for obligation settlement, and it cannot be split between the company´s owners. Due to the limited market with forest land in Slovakia, the real market value determination is problematic.
- Determination of the procedure for forest stands valuation. The final value of forests stands obtained by different methods in many cases varies significantly, causing disturbed objective valuation of the enterprise assets as a whole. The best alternative seems to be using the cost prices for young forest stands (approx. until the growth phase coppice) and for older stands the most precise methods is the present value of expected net cash flow. Due to the turbulent environment of the timber market, market valuation of this biological assets can be recommended only for rotation stands ready for logging.
- The method of reporting the value of forest land and forest stands in the protective forests and special purpose forests. The main management goal in these forests is not timber production but ensuring the continuous implementation of the protective function respectively specific public benefit functions. Their total share on the forest land was 28,5% in 2014, which represents a significant value.

In general it can be stated that the application of IAS standard 41 will bring forest enterprises in Slovakia increased demands for compiling financial statements. At the same time it will improve the overall view of this type of accounting entities.

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Specifics of Forest Enterprises Performance Measurement

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Keywords: *performance, non-wood forest products, return on equity, profitability*

Introduction

The main objective of each business unit is to stand up to present serious competition and to make a profit, at the same time. Considering this, forest enterprises are not an exception to such ideas, however, except of the economic goals, they need to fulfil other aims, too. The provision of ecosystem services affects the way as well as the result of management of forest enterprises.

The paper provides the results of how the Slovak forest enterprises are prosperous, using the performance analysis. According to the Neumaierová and Neumaier (2002), the value of the enterprise is determined by its performance. Thus, in order to increase the value of the enterprise, it is necessary to increase its performance. However, in the case of forest enterprises, the measurement of their performance is rather problematic because of the specific conditions connected to the management of forest land. Hence, the paper provides indicators that may eliminate the disadvantages of classical approaches to performance measurement.

Material and Method

Performance is rather broad term – in general, it defines the characteristics of how the examined subject provides certain activity, based on the similarities with the reference way of providing such activity. The interpretation of the performance characteristics results from the ability to compare the examined phenomenon with the reference one according to the given criteria scales (Wagner, 2009).

According to the definition of the European Foundation for Quality Management, the performance is perceived as the level of results obtained by the individuals, groups, organisations and their processes (Nenadál, 2001). Using performance, the picture of enterprise is presented from the financial as well as non-financial point of view and, moreover, performance may serve as a tool for the competitiveness assessment and, in a broader context, for the assessment of its vitality and further development.

A large segment of forestry research literature has contributed to the advancement of knowledge from the perspective of effectiveness and efficiency by describing performance in a technical and statistical manner through the development of various analytical models that can be applied to forest harvesting, production-oriented dashboards, productivity surveys or by studying the impact of external economic conditions on operating costs (Drolet and LeBel, 2010). The traditional way of performance measurement is still based on the evaluation of chosen financial indicators of effectiveness and efficiency. It includes the following methods:

- Analysis of revenues and sales
- Analysis of profit
- Analysis of profitability
- Analysis of enterprise value

Unfortunately, under the conditions of forest enterprises, these approaches are somehow problematic. In the case of analysis of revenues and sales, it is necessary to take into account the effect of legal conditions causing the limited forest production because of limits of forest management plans. Increased revenues can also be provided, except of the increased volume of production, by the increased prices of outputs. On the other hand, there are still limits originated from the market barriers based on the structure of demand and supply of raw wood material.

Effect of ecosystem services provided by the forests is mostly visible in the area of limited possibilities of decrease of costs of forest management. Forest enterprises are obliged to provide certain level of such services – this situation obviously leads to the increased level of costs.

Analysis of profitability is based on the analysis of profit made from the stockholder's or total equity. In the case of forest enterprises, the problem arises because of the inability to effectively use whole forest property – e.g. due to the existence of forest stands with the prevailing protection or environmental forest function.

Disadvantages of such approaches might be partially compensated by the analytical approaches to the performance assessment. They are based on the bilateral relations between the analytically defined input and material output of the

transformation process. Such indicators are as follows (Zalai, 2013):

- Indicators of productivity and efficiency based on the ratio of *Output/Input*
- Indicators of intensity based on the ratio of *Input /Output*

In the case of the analysis of the group of forest enterprises, the following indicators have been modified:

1. Indicators of productivity and efficiency:

$$Logging\ efficiency = \frac{Sales}{The\ volume\ of\ felling} \quad (1)$$

$$Assets\ efficiency = \frac{Sales}{Forest\ crop\ land^{1}} \quad (2)$$

$$Inventories\ efficiency = \frac{Sales}{Timber\ stocks} \quad (3)$$

2. Indicators of intensity

$$Resource\ intensity = \frac{Timber\ stocks}{Sales} \quad (4)$$

$$Logging\ intensity = \frac{The\ volume\ of\ felling}{Sales} \quad (5)$$

Results

Results of these studies are listed in the following Tab. 1 and Tab. 2.

Table 1: The resulting values of indicators of productivity and performance.

Indicator	2014	2013	2012	2011	2010
Growing stock (mil.m^3)	476,60	475,45	472,18	466,07	461,95
Volume of felling (mil.m^3)	9,41	7,83	8,23	9,46	9,85
Forest crop land (ha)	1 941 990	1 941 520	1 940 300	1 940 100	1 938 870
Area of commercial forests (ha)[2]	1 390 000	1 382 800	1 371 290	1 365 890	1 370 200
Sales (mil.Eur)	532,88	470,91	494,44	544,24	478,82
Timber sale revenue (mil.Eur)	430,18	384,73	391,84	433,42	376,88
Timber sale revenue – instant prices (mil.Eur)	430,18	369,01	340,14	354,53	361,43

[1] Total area of forests

[2] Productive forests, a primary objective in the management of commercial forests is the production of high quality timber without compromising other important ecological and social functions.

Continuation of the Tab. 1

Indicator	2014	2013	2012	2011	2010
Indicators of productivity and efficiency based on timber sales revenue – current prices					
Logging efficiency	45,67	49,07	47,61	45,78	38,22
Assets efficiency (based on forest crop land)	0,0002	0,0002	0,0002	0,0002	0,0002
Assets efficiency (based on area of commercial forests	0,0003	0,0003	0,0002	0,0003	0,0003
Inventories efficiency	0,90	0,81	0,83	0,93	0,82
Indicators of intensity based on timber sales revenue – current prices					
Resource intensity	1,11	1,24	1,21	1,08	1,23
Logging intensity	0,02	0,02	0,02	0,02	0,03

Source: Own processing by Green Reports on Forestry (2012, 2011, 2010)

For the assessment of impact of changes in output on selected inputs were used ratios comparing the performance of the two immediately following periods as well as the absolute differences between these variables. The resulting values define the input level changes induced by output changes by 1%. The obtained results have been assigned to one of four groups:

- intensive development - output growth is not caused by any increase in inputs, in some case inputs decrease,
- mostly intensive development - output growth of 1% was caused by an increase in inputs range from 0.01% to 0.49%,
- mostly extensive development - output growth of 1% was caused by an increase in inputs range from 0.5% to 0.99%,
- extensive development - if the output growth of 1% called for input increase by 1% or more. The only factor of output growth is quantitative factor (amount of input).

Table 2: The differences of indicators.

Indicator	Timber sale revenue – instant prices (mil. Eur)	Volume of felling (mil.m³)	Logging efficiency	Forest crop land (ha)	Assets efficiency (based on forest crop land)	Area of commercial forests (ha)	Assets efficiency (based on area of commercial forests	Growing stock (mil.m³)	Resource intensity	Result
2014/2013	1,16	1,20	0,97	1,00	1,16	1,00	1,16	1,00	1,16	Extensive management
Absolut	61,17	1,58		470,00		6 700,00		1,15		
2013/2012	1,085	0,95	1,14	1,00	1,08	1,00	1,07	1,01	1,08	Extensive management
Absolut	28,86	-0,39		1 220,00		11 510,00		3,27		
2012/2011	0,96	0,87	1,10	1,00	0,95	1,00	0,95	1,01	0,95	Intensive management in logging. Extensive management in the area of forest crop land and growing stock
Absolut	-14,38	-1,24		190,00		5 400,00		6,11		
2011/2010	1,08	0,90	1,13	1,00	1,08	0,99	1,09	1,01	1,07	Intensive management in logging and area of commercial forests. Extensive management in the area of forest crop land and growing stock
Absolut	-26,99	1,10		650,00		-4 310,00		4,12		

Discussion

The presented results show the measurement of enterprise performance adapted to the conditions of forest enterprises. Based on these results, it is obvious that the increased performance was caused mainly by the extensive management – it was proven by the increased area of forest land as well as by the increased growing stocks of timber. In 2011, the intensive increase of revenues was noticed – however, it was caused by the decreased volume of harvested timber as well as by the decreased area of production forests.

Based on the analysis, the following risky factors of the increased performance of the Slovak forest enterprises can be identified:

- decreased volume of planned allowable cut – it may lead to the increased timber prices
- increased share of accidental felling – it may lead to the decreased unit revenue and increased costs of harvesting and silviculture activities
- decreased area of production forests
- increased tax and levy burden of forest enterprises

The analysis of performance does not present only the past-view – it also serves as a significant managerial tool needed for definition of future objectives together with the identification of ways how to achieve them.

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Image of the state forest enterprise LESY SR

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Keywords: *forestry, public relations, state forest enterprise, Slovakia*

Introduction

Today forestry faces many challenging issues, among them how to deal with its low social acceptance and marginal public support. In the past the forester was perceived as an honorable person, whereas in the last 50 years the situation changed and foresters as well as forest are seen as an "enemy of the public" (Novotný, 2011). The reason for this dramatic swap is mainly seen in unclear public relations between the forestry community and society. Moreover, these developments had been used by their competition to form a negative image often portraying the forester as a "devastator of the nature" (Gogola, 2008; Novotný, 2011; Riedl, 2010).

How the forest community and forest enterprise are perceived by the public is crucial to know for designing the marketing and especially forestry communication strategy (e.g. Dichter, 1985). Accordingly, "communication is a particularly important task, because forestry is a minority issue in most countries, mainly due to its weak economic relevance for society in the context of a strongly urbanized society" (Fabra-Crespo and Rojas-Briales, 2015: 20). As a result, an introduction of various initiatives at the EU (e.g. EU Forest communication strategy, FAO forestry programme: strategy for communication) and national levels (e.g. in Slovakia for instance Public relations conception – communications strategies in forestry) had been observed. However, more research into the public perception of forests and forestry had to be done in order to better define their communication strategies (Fabra-Crespo and Rojas-Briales, 2015).

Forests across Eastern Europe are more than 50 % in state ownership and their management is dependent on its decision makers (FAO, 2011). In the case of Slovakia, 40 % of forests are in the state ownership but more than 50 % are managed by the state forest enterprise (Ministry of Agriculture and Rural Development of the Slovak Republic, July 2015). In the last decade the media has associated the state forest enterprise with several controversial cases in the management of forest. Especially conflicts between foresters and environmentalists as a result of different views on nature protection and forest management were promoted in the media. The image of foresters and the state forest enterprise was downgraded. Only recently has the forest community started more adequately communicate with the public (Marušáková, 2007). Although the conditions were introduced so that forestry would be perceived more positively, very little is known about how state forest managers as well as society perceive the forest community in general and particularly the state forest enterprise LESY SR. The goal of the presented study is therefore to bring more light onto the currently perceived image of the state forest enterprise LESY SR.

Material and Method

The target population consisted of two groups of respondents. One group involved all managers of 23 sub-enterprises of the state forest enterprise LESY SR, which has its headquarter in Banská Bystrica, Slovak Republic. The other group was made of 384 respondents representing the general public residing in the Banská Bystrica region. As the sourcing of the whole sample would be difficult and costly, this group was identified with the help of the snow ball method (Lamnek, 2010).

A structured questionnaire with one open and 16 closed questions was applied for data collection with the help of electronic means (e.g. Kita 2002; Silverman 2004). The answers acquired concerning the perception of marketing strategy were measured on 4-point Likert-scale (Kozel, 2011). All other answers had a polar character. More precisely, the respondents were asked to indicate their perception on the scale from having very low perception to a very high one. The focus of the structured questionnaire was threefold. Firstly, perceptions of forest management effectiveness of state versus non-state forest enterprises were analyzed. Secondly, awareness of the marketing strategy of the state forest enterprise LESY SR was the focus of seven questions. Finally, extra emphasis was given to the perception inquiry concerning the public relations of the state forest enterprise LESY SR.

Collected data were processed with the means of descriptive statistical methods, particularly frequency analysis (Rimarčík, 2007).

Results

The results of the image inquiry focused on three issues. Firstly, while the majority of general public viewed non-state forest enterprises as more effective in forest management, the state forest managers commonly associated effective forest management with their state forest enterprise LESY SR (Figure 1).

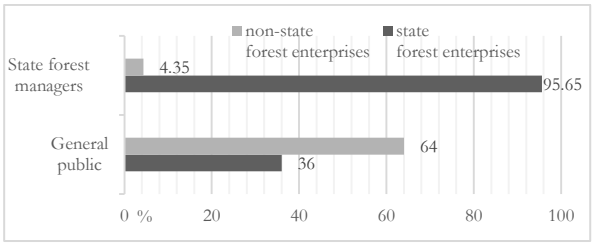

Figure 1: Opinion of the general public and state forest managers regarding forest management in state and non-state enterprises.

Secondly, when the perception of marketing strategy by the state forest enterprise LESY SR was analyzed (Figure 2), the findings revealed that the general public perception of the marketing strategy grasped via 7Ps was poorer in contrast to the state forest managers' perception. For instance, while the state forest managers highly perceived product (e.g. felling volume) and price strategy (e.g. price politics), general public perceptions of these activities were rather from middle to low. An exception was that all respondents highly perceived people's qualities (e.g. education and experience levels).

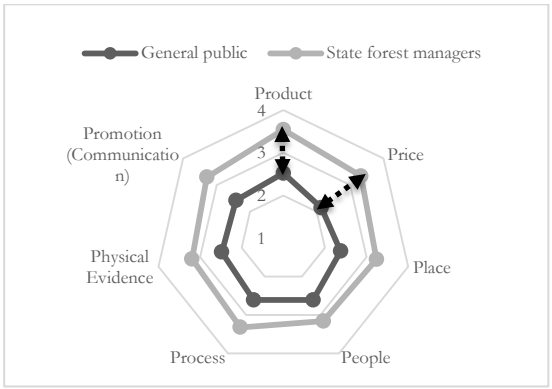

Figure 2: Perception of general public and state forest managers relating to marketing strategy of the state forest enterprise LESY SR.

As the greatest differences in perception existed between the product and price strategy, their detailed analysis revealed that activities such as timber felling and the timber trade are middle (almost negatively) perceived by the general public (Figure 3). In contrast, state forest managers highly (positive) perceived silviculture and forests protection activities next to timber felling.

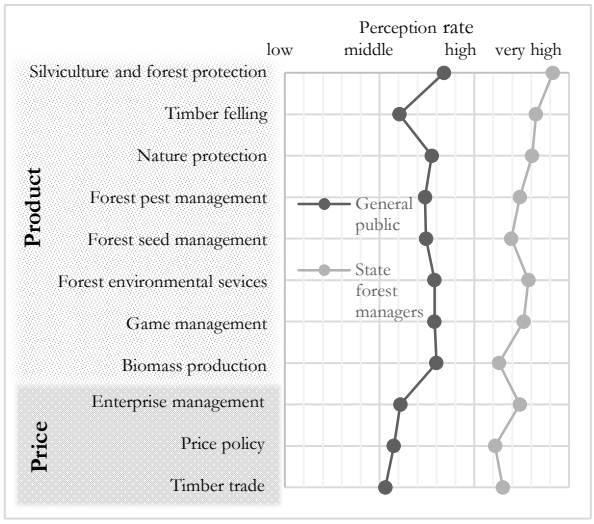

Figure 3: General public and state forest manager's perception of the product/ price strategy of the state forest enterprise LESY SR.

Special attention was given to the analysis of public relation activities of the state forest enterprise LESY SR (Figure 4). Based on the results, perception of these activities among the general public was rather small as almost 31 % of the respondents did not know or had not experienced any activity offered by the state forest enterprise LESY SR. The most known and visited public relations activities belonged to the "Museum in St. Anton." In contrast, for instance, the general public lesser perceived the existence of "Forest pedagogics – Trees of knowledge."

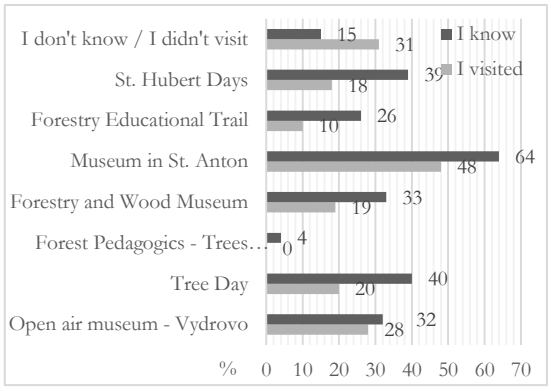

Figure 4: Comparison between public awareness/experience with public relations activities of the state forest enterprise LESY SR.

Discussion

The image of the state forest enterprise LESY SR – the biggest forest manager in Slovakia, had been in the last decades rather confrontational. The findings revealed that this perception did not change much. Largely, the general public relatively weakly perceived the image of a state forest enterprise. For instance, middle (almost negative) perception was associated with price politics or

high rates of timber felling. In contrast, state forest managers commonly quite highly perceived the overall image of the state forest enterprise LESY SR. These findings lead to two conclusions. Firstly, the general public is sensitive to media information on forests and forest enterprise, most likely, because these are often fairly negative. More precisely, media reporting on corruption cases within the state forest enterprise LESY SR, unauthorized timber felling in protected areas, long-term timber contracts with selected timber processing companies or problems with the over preservation of brown bear caused an unfavorable public opinion and damaged a good image. Secondly, the general public mostly obtains information concerning activities of the state forest enterprise LESY SR from the media. On the one hand, this information is often provided by non-governmental organizations and has varying degrees of accuracy. On the other hand, the state forest enterprise LESY SR does not adequately communicate and inform society about public relation activities. Hence, the communication strategy, particularly public relations have to become strategic to the enterprise in order to improve its image (e.g. Gogola 2008, Sarvaš 2015). The enterprise should continue the presentation of its work via "Hubert days", "The tree day" or "Forest pedagogics", among others. However, it is necessarily also to develop a united forest communication strategy for presentation in the media of forestry and the importance of forests for society (Novotný, 2011). Finally, for improving the image of the state forest enterprise not only communication strategy is important, but also the whole marketing strategy. In this respect, it is necessary to employ transparent economic activities, ethical business behaviors and to follow sustainable forest management policy. To conclude, "[…] it takes considerable time to build up a certain image and customer confidence and […] it takes only a few minutes to lose this market advantage" (Mantau et. al, 2007: 302).

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Comparison of share prices of Brazilian forestry companies

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Keywords: *sustainable development, Brazilian forestry companies, business evaluation, social responsibility, Global Reporting Initiative*

Introduction

This study sought to examine whether investments by Brazilian forestry companies, concerning activities that shape social responsibility, are reflected in the values of their shares.

The overall objective was to determine whether forestry companies with configured social responsibility offered greater security for investors than those without it.

The specific objective was to compare the financial volume and the variability in the values of the shares of forestry companies with or without configured social responsibility.

Here, a company with configured social responsibility was one that developed its sustainability report according to the guidelines proposed by the Global Reporting Initiative (GRI).

These guidelines were expressed by qualitative or quantitative indicators that addressed the following aspects: environmental, human rights, labor practices and decent work, society, product liability, and economical. (GRI, 2012a, b)

The GRI, founded in 1991, is an international non-governmental, non-profit organization, based in Amsterdam, Netherlands, whose mission is to make standard sustainability reports to be adopted by all organizations. (GRI, 2012 c, d)

This work is part of a larger study about evaluating companies, whose aim is to extend the concept of this type of evaluation and incorporate aspects of social responsibility to traditional assessments of the economic and financial aspects; as characteristic of sustainable development. (Rocha, 2014)

Sustainable development or sustainability is a social paradigm on the possibility of achieving economic development, within the expansion and accumulation logic, without greatly compromising the natural resources for future generations. (Rocha and Chaves Neto, 2014)

Material and Method

The present investigation covered the period from 2009 to 2011, and was limited to Brazilian forestry companies legally constituted as joint-stock companies. Their capital is divided into shares that are traded on the main Brazilian stock exchange, BM&FBOVESPA, and they were listed in the basic materials sector, in the wood and paper segment.

In May 2012, these companies were: Celulose Irani S. A., Companhia de Melhoramentos de São Paulo S. A., Duratex S. A., Eucatex S. A., Fibria Celulose S. A., Klabin S. A., Santher Fábrica de Papel Santa Therezinha S. A., Suzano Holding S. A., Suzano Papel e Celulose S. A. They constituted a convenience sample of Brazilian forestry companies, but expressed an elite stratum of such universe, since they were subject to mandatory transparency of their production practices and to a more rigorous specific legislation of intense scrutiny.

The data analyzed were the daily prices of the shares of Brazilian forestry companies under study, available on UOL (2013); as well as the basic profit, or prejudice, per share, collected in standardized financial statements, available on BM&FBOVESPA (2012).

The comparison between stock values was performed by quantitative approach, featuring a statistical, descriptive and comparative study; and the annual financial volume was compared by contrast.

Results

The Table 1, below, shows the annual financial volume of the companies investigated.

Table 1: Annual financial volume, in real (R$), concerning shares of Brazilian forestry companies with or without configured social responsibility.

Year	With configured social responsibility	Without configured social responsibility
2009	R$ 12,754,897,925.41	R$ 227,392,386.60
2010	R$ 27,062,065,742.92	R$ 329,847,380.28
2011	R$ 18,794,080,302.96	R$ 169,988,031.28

Source: Rocha (2014)
Note: USD 1.00 = R$ 1.87, in December 30, 2011.

The Table 2, exhibits the daily prices' coefficients of variation of their shares.

Table 2: Daily prices' coefficients of variation, in percentage, of the shares of Brazilian forestry companies.

Configured social responsibility	Company	2009	2010	2011
With	Celulose Irani	12,29	11,11	10,61
	Duratex	9,53	7,42	25,56
	Fibria	12,12	13,79	25,07
	Klabin	11,44	8,45	7,62
	Suzano Papel e Celulose	19,12	17,36	26,81
Without	Cia Melhoramentos de São Paulo	22,79	11,86	6,22
	Eucatex	39,32	27,58	14,07
	Santher[1]	-	-	-
	Suzano Holding	2,80	38,50	0,00

Source: Rocha (2014).
[1] There was no negotiation of the shares.

The table 3, presents the relationship between the basic profit, or prejudice, per share and the average annual price of a share.

Table 3: Relationship between the basic profit, or prejudice, per share and the average annual price of a share of Brazilian forestry companies, in percentage.

Configured social responsibility	Company	2009	2010	2011
With	Celulose Irani	14,4	16,3	4,7
	Duratex.	3,3	5,8	5,4
	Fibria	24,0	3,6	(12,0)
	Klabin	3,4	10,5	3,1
	Suzano Papel e Celulose	20,8	12,2	0,6
Without	Cia Melhoramentos de São Paulo[1]	30,5	-	-
	Eucatex[2]	29,6	5,7	3,6
	Santher [3]	-	-	-
	Suzano Holding[4]	-	22,2	-

Source: Rocha (2014).
[1] Did not present the prejudice per share in 2010 and 2011, however it informed the annual prejudice of R$ 25,768,000.00 and R$ 4,456,000.00, respectively.
[2] The company was under investigation for indications of public money laundering (Azevedo, 2013).
[3] There was no negotiation, but presented basic profit in 2009 of R$ 896.91/share, basic prejudice of R$ 2,600.00/share in 2010, and basic prejudice of R$ 2,606.00/share in 2011.
[4] There was no negotiation in 2009 and 2011. In 2010, there were only two negotiations.

Discussion

According to Table 1, forestry companies with configured social responsibility had together greater annual financial volume than those without it.

On Tables 2 and 3, notices that the variability of shares' prices were more uniform among those companies with configured social responsibility than those without it.

The relationship between the basic profit, or prejudice by share and the average annual price of a share, presented on Tab. 3, were more transparent for companies with configured social responsibility, meaning that the investor had more information about them.

The results found highlight that among the Brazilian forestry companies studied, those with configured social responsibility were more adapted to remain on the market, showed greater transparency in their production practices and

offered less risk for investors, compared to those without configured social responsibility.

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Assessing Differences in Ownership Objectives, Attitudes, and Management Behavior of Private Forest Owners

The Role of Multi-Generational Ownership

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Keywords: *private forest owners, inheritance, forest management*

Introduction

Private forest landowners control the majority of all forestland in the United States. In fact, this ownership class controls 58 % of U.S. forests; in the southern U.S., which is the focus of this paper, their share jumps to 96 % (Oswalt et al. 2014). Given that corporate ownerships are more likely to apply sound forest management practices, non-corporate ownerships, which comprise almost 45 % of the private forest base, typically do not manage their forests as intensively as corporate owners, and have been the target of much research and education efforts directed at encouraging active forest management for both timber and non-timber goods and services.

More recently, researchers have begun to examine the role that long-term ownership plays in private forest ownership objectives and management. Majumdar et al. (2009) provide a thorough review of past research that has examined differences between landowners who have inherited their forests from family members and those who have purchased the forestland outright. Based on this review and their assessment of the data from a national forest owner survey, they conclude that "inheritors are significantly more active forest managers in the production of both timber and

nontimber forest products compared with noninheritors", and specifically more likely to participate in timber production activities. One limitation of their analysis, however, is that they limited the analysis to those who indicated that they had inherited the land. In the U.S., children or other family members may purchase land from previous generations rather than inherit the land for a variety of reasons. Therefore, limiting the analysis to those who inherit the land as 'legacy' owners may mask the true characteristics and behavior of multi-generational forest owners.

This paper utilizes data from a private forest owner survey conducted in Tennessee in the southern U.S. that asked owners to indicate whether they had purchased or inherited the land, as well as how many generations the forest had been in their family. This allowed us to examine multi-generational owners regardless of how they acquired the property and assess differences in ownership objectives, demographic characteristics, and management behavior.

Material and Methods

As stated in the Introduction, data for the analysis were obtained from a mail survey conducted in 2007 by Hoyt (2008). Landowners were randomly selected from a 16-county area of the Cumberland Plateau in Tennessee. The questionnaire was mailed to more than 1,700 NIPFs in 2007 following the Total Design Method (Dillman, 2000). Two hundred forty-six names were eliminated from the survey due to bad addresses, death, or having sold the land. A total of 590 completed surveys were returned, yielding an adjusted return rate of 41%. Survey questions were grouped into five categories: sociodemographic characteristics, forest ownership and management objectives, attitudes regarding incentives, motivations for owning forests, and future ownership plans.

Of particular interest for this study was a question asking respondents to indicate the number of generations the forestland had been in their family. The results of this question were used to assess how multi-generational forest owners (denoted as 'legacy' owners in the paper) differed from first generation owners ('non-legacy' owners) in terms of ownership objectives, demographics, and management actions. These differences were assessed with a variety of statistical methods including correlation analysis and logistic regression.

Results

The sample used for this analysis was based on the responses to the number of generations that had owned the forest property. Any respondent who indicated that they were the first generation owner was identified as a 'non-legacy' owner, while any respondent who indicated that they were at least the second generation of their family who has owned the property were classified as a legacy owner. This resulted in 82 non-legacy and 184 legacy owners used in the subsequent analyses. The legacy owners included 40 individuals who had purchased the land but from a family member and

all those who indicated that they had inherited the land. A large number of respondents who purchased their forestland did not respond to the question on generational ownership and were omitted from the analysis.

The initial assessment revealed some significant differences in ownership objectives between legacy and non-legacy owners, though few sociodemographic differences. Specifically, legacy owners were less likely to own forestland as a financial investment or to enjoy scenery; they were obviously more likely to have inherited the land or hold the land as a connection to the past (Table 1). The only sociodemographic characteristic that was significant was that legacy owners were, on average, older than non-legacy owners.

Table 1: Correlations between legacy owners and ownership objectives and demographic characteristics.

Objective/Charact.	Pearson Correlation	Significance
Financial Invest.	-0.136	.015
Enjoy Scenery	-0.158	.005
Inherited Land	0.560	.000
Connect to Past	0.366	.000
Income	-0.087	.134
Gender	-0.017	.759
Age	0.156	.005
Education	-0.084	.127

Utilizing logistic regression, we examined the importance of legacy ownership in terms of forest harvesting behavior, as well as other ownership objectives, use of forestry assistance, motivations for harvesting, and sociodemographic characteristics. The results reveal that multi-generational (legacy) ownership was positively related to the likelihood of forest owners participating in timber sales on their property in the past (Table 2). Likewise, owners who held their forests for timber production purposes, reside on the forest property, had sought forest management advice were more likely to have sold timber in the past. Conversely, more educated landowners were not as likely to have sold timber as those with less education. This is not a surprising result; more educated owners are also likely to be wealthier, reducing the need for forest-based income. Moreover, these owners are more likely to hold land for non-timber objectives (Vokoun et al., 20006; Majumdar et el., 2009).

Two reasons for considering a timber harvest were also included in the model. In the survey, respondents were asked to rank the importance of a series of reasons that might be offered for conducting a timber sale, regardless of the respondent's harvesting/timber sale history. One of these, 'approached by a logger with a strong reputation for conducting acceptable harvest operations' was positively related to past timber sale activity, while conducting a timber sale due to a financial need was negatively related. The logger variable is not surprising; owners are more likely to conduct a timber sale if they are confident that they harvest will be conducted properly. The financial need result was not expected. Although little research evidence exists to confirm the perception, most foresters and researchers in the U.S. believe that financial need is a strong motivator for timber sale activity. Perhaps the respondents are still holding their forests until a financial need occurs.

Table 2: Logistic regression results for past harvesting activity*.

Explanatory Variable	β	S.E.	Wald	Sign.
Legacy	.672	.294	5.24	.022
Timber Production	.510	.112	20.82	.000
Forestry Advice	1.186	.351	11.41	.001
Reside on Forest	.728	.293	6.16	.013
Logger Rep/Sale	.272	.092	8.72	.003
Financial Need	-.236	.107	4.90	.027
Education	-.224	.099	5.09	.024
Constant	-1.804	.627	8.27	.004
* 71.7 % of cases correctly classified				

Discussion

Although the study presented is focused on a small forest owner population in one U.S. state, the results mirror much of the earlier work on those who self-identified as inheritors in the Majumdar et al. (2009) study. Specifically, multi-generational, or legacy, owners were more likely to participate in timber production activities, specifically timber sales, than first generation owners. They also were less likely to hold the land for aesthetic reasons, similar to those on the Majumdar et al. (2009) analysis, or for financial investment purposes. This is particularly pertinent in the study region. During the period in which the original survey was conducted, the Cumberland Plateau had been identified as very attractive location for vacation and retirement homes. As a consequence, many individuals purchased forestland during the early 2000s either for individual use as a vacation or retirement home or for investment speculation, with the hope of reselling the land for a significant return (Ostermeier and Hodges, 2008; Guo and Hodges 2009). Previous work (Ostermeier and

Hodges, 2008) highlighted the differences in multi-generational owners in this regard.

Majumdar et al. (2009) highlight some important implications of their findings regarding inheritors, or legacy owners in the current study: the importance of timber production and links to and consistency of future plans among this owner group, as well as the long-term perspective of these legacy owners and what this may mean for future policy alternatives. Coupled with the findings of Ostermeier and Hodges, 2008, the results presented here support many of the conclusions of Majumdar et al. (2009). Specifically, the legacy owners are more likely to take a longer-term, albeit more commodity-focused, perspective than first generation owners. This presents some significant implications for any future public policy deliberations. As noted by Majumdar et al. (2009), legacy owners are less likely to be interested in policy options that limit future management flexibility such as conservation easements, particularly as they affect commodity production opportunities. It is important to remember, however, that this timber orientation does not diminish legacy owners' interest in environmental integrity. While they are interested in timber production, multi-generational owners in this region were more likely than other groups to consider the environmental effects of their management activities (Ostermeier and Hodges, 2008).

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Comparing the added value of domestic timber - produced and processed in different supply chains in South Tyrol

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Keywords: *domestic wood supply, value added chains, cascaded timber usage*

Introduction

Traditionally the forest administration (Landforstkorps) in South Tyrol (Italy) marks - comparable to North Tyrol (Austria) - the trees foreseen to be harvested with the forest-hammer (§172, forest law 1975, BGBl. Nr. 440/1975). Over the last decades, such a dependency from administration was perceived as a limit to the property right, while currently not even all the marked trees are harvested anymore. The economic function of forests in Italy is therefore less relevant than in Austria or Germany as it was claimed in recent years that logs do not gain a valuable economic benefit and legislative reasons implies that 58% of the forested territory are protected forests. This explains, why in 2014 the amount of foreseen harvests (m^3 of marked trees) in relation to the total forest area (356,853 hectares) with 2.6 m^3/ha covered approximately 46% of the increment (5.5 m^3/ha). Thereof ca. 75% are logs that are processed in domestic sawmills or exported. As South Tyrol has installed in nearly all municipalities district heating plants (DHP), the demand for pulp-wood and timber chips is enormous. Additionally, several private heating plants also operate locally. From the 25% potentially available domestic pulp wood appropriate for being allocated to the heating plants (Agrar- & Forstbericht, 2014) only 44.8% (96,894 m^3) are supplied, which is 18.4% less than one fifth of the total demand from the DHP (Agrar- & Forstbericht 2014 and Mühlberg et al., 2013). This limit impacts the price and quantity demanded on the market: the volume of 1 m^3 (vm^3) timber-chips gains 22€/vm^3 (2,7vm^3=1m^3) whereas fuel wood achieves 47€/m^3 (SBB, 2015). Such a price policy, directly linked to local providers, leads to irrational decisions. In fact, even logs of lower quality are sold to DHP. Due to the lacking domestic supply, regional suppliers are directly competing with foreign suppliers that can benefit from scale effects and a higher mark up on each vm^3 of timber chips. Thus the still not thinned reserves of forest stands and low harvest-quotes in relation to the increment bear high potential for enhancing the regional value added (Mühlberg et al., 2013).

Lacking extraction of natural timber resources in South Tyrol and limited consideration of cascaded timber usage, promoted the research approach carried out in the framework of the South East European project FOROPA (Oberegger et al., 2014) on the economic effects, natural forest resources may gain, if they were processed and valorised regionally. To estimate the added value (AV) of processed domestic timber for different production chains in selected regions, the following research questions were emphasized:

Which regional AVs are gained per m^3 converting pulp wood to energy, logs to wood-panels for building timber houses or high quality logs to furniture in the joinery field?
Finally it was researched, which kind of multiplying effects (additional value added) intermediate-suppliers create to each actor vertically inter-connected along the value chain.

Material and Method

Along regional production chains, AVs are obtained due to several refining, processing, and reshaping steps conferring higher values among the involved entities (Graupner, 2010, Haller 2007). An AV in economic terms means fulfilling a basic economic principle: the value of all input factors is lower than the gained output value (Hahne et al., 2007).

The created added value of a product, process or company can be examined in two ways: the indirect method subtracts from the business' total performance the intermediate input-factors for goods and services (Haller, 1997). The direct method in contrast focuses on the economic benefits a company gains for its staff, share-holders, capital providers and the government (Graupner, 2010). Both approaches were applied to the available data.

According to the research questions three value chains from 2012 show effects of cascaded timber usage and potentials of processing qualitative different domestic forest resources for the region. Therein the survey on (a) timber chips in Val Sarentino, where resident farmers supply 100% of the required fuel wood to the DHP was most comprehensive. For the analysis of the supply chain, a sample of nine selected farmers covered

exemplarily the characteristics of four different options (Tab. 1), ranging from the transport of wood on the forest road to the storage of timber-chips in the nearest DHP. Thereby data from farming-activities, grants, specific tax conditions and intermediate input factors were considered. To get a comparative insight into the various applications of timber, 2 further explorative regional value chains - (b) timber houses and (c) wooden furniture for bedrooms - were examined. The derived relations from these three supply chains point out the importance of the cascaded timber usage.

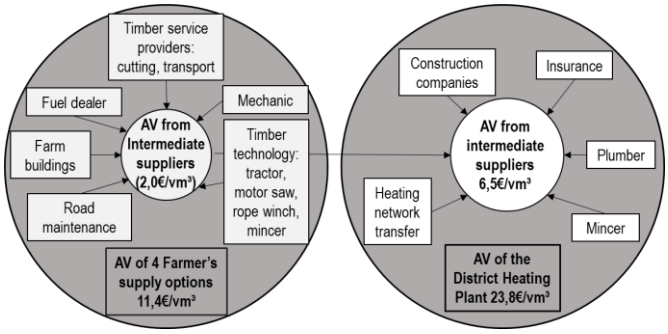

Figure 1: Main actors and intermediate suppliers along the AV chain of timber-chips in Val Sarentino.

Thorough challenges for calculating the value added chain in detail concern the definition of systematic limits and data surveys. The starting point of the study was to estimate the AV for Val Sarentino, considering that only resident farmers supply their pulp and fuel wood to the local DHP. At the beginning the geographical focus was related to the valley boarder. As soon as the impact of inter-mediate suppliers (Fig. 1) and the comparison with more complex supply chains of a timber house or a wooden bedroom was focused at, the spatial range got extended. For providing an impact to the regional value added chain it is obligatory for the actors to be resident in South Tyrol. Besides, the calculative approach to extract the economically relevant positions of each actor and intermediate suppliers to determine the total AV along the supply chain turned out to be complex: (a) if for instance no data were available, which is typical for small structured mountain farms, interviews with farmers enabled to gain realistic estimations of yields and expenditures for supplied fuel wood.

(b) Or in contrast, if actors or intermediate suppliers provided balances or input-output calculations, it was nevertheless difficult to separate affected business-parts from other economic activities. As cost accountancy was usually lacking, responsible stakeholders from these business units supported the estimation of economic shares according to their activities in the value added chain.

Results

By means of four different supply options farmers provide annually ca. 11,235 m³ fuel wood to the DHP in Val Sarentino. Depending on type and dryness of timber-products for the volume of 1m³ (vm³) timber chips prices between 16 and 27 €/vm³ are paid. Besides the varying results can also be traced back to outsourcing or machine usage. Particularly supply option 3 deviates most. Here farmers outsource nearly 50% of the value added to interim suppliers. As not all assigned enterprises are located in South Tyrol, and as less was paid for the provided low quality of round wood, the value added was low. In contrast, chain 1 and 4, where farmers cover most of the work themselves, have low machinery usage and supply only round wood, achieve the highest AVs. They perform better than chain 2, although farmers there supply even timber chips and get thus better prices. But due to high costs for machinery usage with low impact to the value added, the result is lower than in chain 1 or 4. According to the individual organisation of the work-process, the AV for the farmer's stage, calculated with the indirect method, varies as pointed out in Table 1.

Table 1: Value added of timber-chips in Val Sarentino.

Supply Option	Timber Chips €/vm³	Interm. Suppliers €/vm³	Farmer's total AV €/vm³
1	14,4	2,5	16,9
2	8,3	2,9	11,2
3	4,1	4,0	8,1
4	15,8	0,6	16,4
Weighted mean	11,4	2,0	13,4

Depending on farmer's payment and on executing certain activities agreed with the DHP (chipping and transport) in some supply chains, the AV for the DHP varies. Chain 2, which already supplies timber chips generates low AV for the DHP due to higher farm payments. On contrary low farmer's payment in chain 3 combined with outsourced transport and chipping to the DHP, enhanced the AV for the DHP (Tab. 2).

Table 2: Value added of Val Sarentino's district heating plant (DHP).

Supply Option	DHP €/vm³	Interm. Suppliers €/vm³	DHP's total AV €/vm³
1	23,2	6,00	29,2
2	22,8	4,76	27,5
3	26,5	7,07	33,6
4	23,2	7,07	30,3
Weighted mean	23,8	6,5	30,3

The same concerns the intermediate suppliers. Chain 2 with its processed timber chips gains here less added value, as chipping and transport needn't to be considered. If summing up the chains of the two actors, one vm³ would have gained an AV of 43.7€/vm³ or 118€/m³. Thus the AV for the region is due to the supplying farmers and the DHP ca. three times more than if the same vm³ would have been exported (13.4€/vm³).

What kind of effect could be achieved, if domestic timber is processed to products of higher quality? By means of the direct method, the AV is examined for the shell construction of a timber house (110m² and 100m³ sawn wood) and the furniture for a wooden bed-room (2m³ of best timber quality). To ease the calculation the same ratio of AV to sales (AV/S) as for the timber chips chain was applied to the farm level. Regarding sawmill 13% and for the carpenter 53% of the AV/S were calculated by means of balance sheets and the expertise of managers. Concerning intermediate suppliers it was agreed to estimate 11% for the saw-mill and to record 1% for the carpenter, who covers most of the construction steps himself (Tab. 3).

Table 3: Regional AV of a timber house.

	Main actors			Interm. Suppliers	Total
	S €/m³	AV/S %	AV €/m³	AV €/m³	€/m³
Farm	105	54	57	5	**62**
Sawmill	108	13	14	12	**26**
Carpenter	396	53	210	7	**217**
total			**281**	**24**	**305**

S…sale; AV…added value

Are logs of best quality processed to furniture for a bedroom, the added value grows exponentially (Tab. 4). Thereby the AV for the farm and saw-mill section raises due to the quality of logs. The main AV increment evolves from the joinery. By means of cost accountancy the relevant cost positions were accessible for deriving the regional AV.

Table 4: Regional AV for the wooden furniture of a bed-room.

	Main actors			Interm. Suppliers	Total
	S €/m³	AV/S %	AV €/m³	AV €/m³	€/m³
Farm	130	54	70	5	**75**
Sawmill	240	13	31	26	**57**
Joinery	1,350	46	620	366	**986**
total			**721**	**397**	**1,118**

S…sale; AV…added value

In both cases it becomes evident that the main share of the AV is generated for the timber house (71%) as well as for the wooden furniture (88%) at the final processing stage. The higher the degree of processing and the more actors involved, the more AV can be generated. If the logs of best quality would have been exported than processed to wooden furniture, the region would have lost 1,043€/m³. Thus it is important for a region to consider the cascaded usage of the domestic timber resources for gaining an optimal AV.

Discussion

VA means much more than streamlining business profits. Moreover, it is an essential instrument to determine who generates and maintains jobs, income and contributes to public budget (Gothe and Hahne, 2006). In addition to the classic sector-based macro-economic analysis of regions (NUTS2 or NUTS3), the concept of added values enables a deep and detailed insight on vertical and horizontal relations with intermediate suppliers from different sectors along the production chain. Thereof the priority impact of AV chains on macro-economic items, like employment, tax payment or multiplier effects with other sectors can be enlightened from various perspectives. These societal benefits should create incentives and valorisation to the operating entrepreneurs of a region.

Although the direct or indirect method are theoretically well defined, the empirical applicability is challenging. Particularly to determine multiplier effects, system boarders concerning the integration of intermediate suppliers have to be defined. Finally, a systematic monitoring approaches need to be designed, for surveying quantitative data but also including the option of qualitative estimations to cope coherently with lacking data. Due to these practical limits, comprehensive studies on complex AV chains are rarely documented in literature.

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Accounting for non-wood forest products and services in Austria
findings on national and forest holding levels

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Keywords: *non-wood goods, forest services, joint production, diversification*

Introduction

In contrast to conventional logging and sustainable timber management, the concept of sustainable forest management refers not only to timber but to all kinds of outputs and related benefits derived from forests (Pearce et al. 1999; Wilkie et al, 2003). Managing forest ecosystems for the sustainable provision of multiple forest products and services to provide a wide range of benefits for humankind is supposed to trigger diverse positive effects on contemporary global challenges like the mitigation of climate change, poverty reduction, or improving food security. Non-wood forest products and services (NWFPS) are supposed to play an important role in unlocking latent additional potentials of forestry production chains and may provide income to forest owners who are motivated to engage in related businesses (Weiss et al., 2011). As data on the production, management and use of NWFPS are still fragmented and scarce (Toscani et al, 2015; Wolfslehner et al., 2014) their potential to strengthen the economic viability of forest holdings is still under debate (Vacik et al, 2014). In this context, the proper documentation of the quantity and value of NWFPS on forest enterprises at regional and national levels is highly relevant for supporting forest policy decision making in framing the conditions for any stakeholders.

In this contribution we aim to identify the relevance of NWFPS in Austria, both on the national and holding level, and thus, to unravel latent opportunities for the diversification of the product portfolio of forest owners who are willing to invest in the joint production of wood and non-wood outputs. Different methods for identifying the quantity and value of NWFPS are applied in order to account for the fragmented documentation.

Material and Method

A mix of qualitative and quantitative methods was applied to advance the current state of knowledge regarding NWFPS in Austria, including i) an in-depth analysis of existing datasets and statistics, ii) expert interviews, iii) systematic surveys amongst forest associations and NWFPS sector representatives, and iv) scenario analysis.

Results

National level

According to the scheme of the Forest Resource Assessment (FAO, 2012), the total value of NWFPS in Austria reached € 220 mio in 2005 (Wolfslehner and Vacik, 2009). This figure can be interpreted as commercial value of national forestry production chains (i.e. € 95 mio NWFP, € 125 mio services). This is a clear indication for the concept of NWFPS exceeding the sphere of the forest industry as defined by national accounting. According to the Economic Accounts for Forestry, forestry output totalled in 2005 some € 1,178 mio with other forestry products accounting only for 1.3 % thereof (€ 15.5 mio) (Statistics Austria, 2016). An analysis of potential future developments, considering recent trends in consumption and recreation, depicts an increasing value of NWFPS (Vacik et al., 2014). Some quantitative findings in regard to the value of NWFPS in Austria are documented in Table 1, thereby indicating respective developments.

Table 1: Overview of the total value of selected NWFPS in Austria in the years 2005 and 2010.

NWFPS	2005 (mio €)	2010 (mio €)
Christmas trees	37	42
Wild honey and beewax	17	19
Game meat	15	15
Hunting	48	50
Tourism	24	40
Protective services	16	16

Holding level

Empirical information about NWFPS on the holding level originates from the Austrian forest accountancy data network of enterprises managing more than 500 ha (FAN) in terms of auxiliary activities. As such values are recorded only optionally, they are not valid for inferences but serve as evidence from a managerial point of view. Table 2 comprises earnings, cost and profit of all of the eleven categories of auxiliary activities which are generally defined in the FAN. The figures are shown as monetary value per hectare for convenience. Computing figures for NWFPS consistent with the list in Table 1 is not possible,

however (for details see Toscani et al., 2015, p.118f).

Table 2: Overview of earnings, cost and profit of selected NWFPS as documented in terms of auxiliary activities in the Austrian FAN; mean values of the fiscal years 2001 – 2010, inflation adjusted to the value of 2015.

NWFPS	Earnings (€/ha)	Cost (€/ha)	Profit (€/ha)
Hunting	27.80 [1)]	31.35 [1)]	-3.55 [1)]
Fishing	8.39	3.72	4.66
Renting of landed estate	2.28	0.49	1.78
Gravel and sand	3.36	1.19	2.17
Water	0.25	0.04	0.21
Renting of buildings	7.03	8.57	-1.54
Agriculture	6.06	4.02	2.04
Recreation and tourism	2.81	2.82	-0.01
Provision of services	7.19	7.55	-0.37
Forest nursery	1.01	0.93	0.09
Christmas trees, cut	0.54	0.66	-0.12

[1)] Hunting is referred to the documented hunting area, all other values are referred to total area of forest enterprise.

Discussion

Results show that the value of NWFP and services in Austria should not be neglected. Given the diverse range of resources and forest services it pinpoints latent potentials for forest owners to diversify their income generation and to distribute risks that relate to existing forestry production chains. Recent trends even indicate increasing demands for specific forest ecosystem services. Thus we see a strong link to the further economic development of forest holdings with a particular benefit for rural areas, providing assets to socio-economic developments (e.g. employment; counteracting rural exodus). However, the profitability of respective ventures is by no means guaranteed. Whereas some NWFPS are already marketable, others show the characteristics of public goods and could reach marketability through transformation and development (Mantau et. al, 2001). Chances for marketability vary as some NWFPS just need little progression while others may never be successfully transformed.

In this context the possibilities to further develop the FAN as well as case studies to document and analyse the economics of NWFPS are discussed. Many challenges still need to be overcome in order to elicit the highest benefit from both information systems which address quite different aspects of the topic. Even cross-checking and the validation of results is not possible yet. Upscaling values of the FAN to the whole of Austria or referring absolute figures to a reference area require proper definitions of the framework (e.g. do values of the hunting statistics refer to forests alone or to all land available for hunting?). Surrogates, used for the valuation of NWFPS need to be specified as they may refer to quite different notions of value (e.g. market values, imputed values or welfare effects). Respective efforts are required in order to improve our knowledge and understanding in regard to the economics of NWFPS at different levels of management and decision making.

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Using a latent class model to segment preferences of residents for a recreational setting: a case of Golovec urban forest in Ljubljana, Slovenia

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Keywords: *choice experiment, recreation setting, urban forests, preferences, willingness to pay*

Introduction

Green infrastructure, and more specifically, urban forests provide a range of ecosystem services for society in urban environment (European Commission, 2013; European Parliament and European Commission, 2013). Recreation is one of very important as urban forests provide dwellers with an environment to recover from daily stress, physically exercise and to enjoy the scenery of the forest (Konijnendijk et al., 2005). Since recreational habits differ by expectations (Eriksson and Nordlund, 2013; Tyrväinen, 2001), ethnicity (Gentin, 2011), social status (Germann-Chiari and Seeland, 2004) and other socio-demographic characteristics (Jim and Shan, 2013), existence of different interest groups is to be expected. This varitey need to be addressed within management of urban forest to avoid or at least mitigate conflicts among different stakeholders (e.g. forest owners, cyclists, joggers and wildlife watchers). In fact, such conflicts often emerge also due to lack of information on different forest recreational uses, which decision makers need to consider. For instance, infrastructure, which is unsuitable to support different activities can cause discontent among forest visitors making them to leave trails and move into undeveloped forest areas. This can cause damage to forests and trigger frustration among forest owners. Other characteristics also affect forest-recreation experience (Clark and Stankey, 1979). This is also the case for Golovec urban forest in the capital of Slovenia (Ljubljana), which is a rapidly growing (both in population and economic terms) urban area (SORS, 2014).

The research question, which we tried to address were the preferences of Ljubljana's citizens towards different attributes of Golovec urban forest. Those covered aspects of infrastructure (trails, waymarks and information boards) and characteristics of forest stands (outstanding trees, forest openings). One of possible ways to assess the relative importance of the attributes is by choice experiments (CE), where additional monetary attribute, expressed as an additional yearly personal payment, enables estimation of a willingness-to-pay for changes of the before mentioned attributes. In this research, we used a CE, which explored a wider range of thematic and management-related attributes than its predecessors, focusing specifically on urban forests and utilizing CE assessments such as Arnberger et al. (2010) and Nordh et al. (2011). Both dealt with either only one or the other group of attributes. Although Koo et al. (2013) covered both forest and infrastructure-related attributes, the research did not include an additional monetary attribute which would allow for the monetisation of changes in the attributes. Thus, the working approach of this study attempts to complement this previous work. We used a latent-class analytical approach, which enables to segment preferences into groups, which is in line with the issue we highlighted above – heterogeneity of preferences and existence of different interest groups.

Material and Method

Study area

Golovec is a 675 hectares large hilly shaped area of mixed forest, mostly (>75%) privately owned. It is popular to visit and abundantly used for outdoor recreation (Osanič, 2002). In addition to his, it also provides timber to forest owners, and other benefits as carbon sequestration, habitat to wildlife, an element of landscape identity, protection against soil erosion and excessive surface run-off. The area has some basic recreational infrastructure as 14 km of paved trails and 12 either waymarks of information boards. Forest is managed by forest owners according to measures, which are planned by the public forest service. Infrastructure is maintained by the municipality, however, both, forest service and municipality have almost no information on dwellers' preferences over the recreational setting within the forest.

Method

The CE technique is grounded in Lancaster's consumer theory (Lancaster, 1966) and linked to the random utility model (RUM), which is derived from Luce (1959) and McFadden (1973). It provides a basis for empirically modelling respondent choices, revealing trade-offs among the attributes of the good (in our case forest) (Bateman et al., 2002; Hanley et al., 2001).

We used a sequential fractional factorial design to construct the choice tasks, which were based on five attributes and corresponding levels they can take (Tab. 1). Each choice task was composed of three management alternatives, one always presenting the current state with no additional management measures, whereas the other two gave information on possible future management scenarios with changes in the attributes. Those were assumed to bring only improvements of the recreational setting.

Table 1: Attributes of the Golovec urban forest used in choice experiment and the levels they can take.

	CURRENT STATE	**ALTERNATIVE STATES**
Forest openings	[% of forest openings in overall forest area in a 20 m wide strip on either side of a walking trail]	
	0,5 %	**2,0 %, 3,5 %**
Outstanding trees	[% of outstanding trees among all trees in a 20 m wide strip on either side of a walking trail]	
	6 %	**12 %, 18 %**
Waymarks and information boards	[maintenance of information boards and waymarks along walking trails]	
	Unmaintained	**Maintained information boards; maintained waymarks**
Paved walking trails	[length of maintained paved walking trails in kilometres]	
	14 km	**21 km, 28 km**
Payment	[annual personal monetary contribution to a special fund in EUR]	
	0 EUR	**2, 4, 6, 8, 10, 12 EUR**

Choice tasks were presented to 263 respondents (between Jul.-Aug. 2013) and data on their selection of the most preferred management alternatives was analysed by empirical latent-class logit model (Boxall and Adamowicz, 2002). Willingness-to-pay were calculated by using (Boxall and Adamowicz, 2002; Greene and Hensher, 2003). We used AIC, AIC3, BIC for determining the number of latent classes.

Results

The model estimation is given in the Tab. 2 and covers the estimates of the taste parameters, estimates of the parameters of the membership function and the model diagnostics. The optimal model proved to be a one with two latent classes and almost equal share of respondents in each of them.

We have defined the first class of respondents as "change rejecters" as they expressed negative preferences for having more paved trails and for yearly payment. However, they indicated having more outstanding tress as a positive change.

Table 2: The estimation of the latent class model of the discrete choice experiment for Golovec forest.

	Estimates of the utility function parameters	
	Class 1 [share of respondents: 49 %]	Class 2 [share of respondents: 51 %]
Attributes	$\widehat{\boldsymbol{\beta}}$	$\widehat{\boldsymbol{\beta}}$
Outstanding trees	0,17*	-0,00
Forest openings	1,07	0,55**
Forest openings ^{2}	-0,29	-0,12**
Waymarks	-0,45	0,32*
Information boards	-0,16	0,40***
Paved trails	-0,15*	0,01
Yearly payment	-0,85***	-0,14***
Constant term	0,30	2,00***
	Estimates of the membership function parameters	
	Class 1	Class 2: reference class
Additional variables	$\boldsymbol{\theta}'$	
Constant term	1,28	
Age	0,04**	
Settlement type (1-city;0-rural)	-1,00*	
Frequency of visiting a forest	-0,29**	
Walking a dog (1-yes;0-no)	-0,31*	
Picking forest fruits (1-yes;0-no)	-0,68*	
Model diagnostics		
logL	-1007,15	
No. of observations	1602	
pseudo-R^2	0,43	
* p=0,10; **p=0,05; *** p=0,001		

Respondents in this class in comparison to those in the second class seem to be older, are less likely to live in the city, are also less likely to visit forest frequently, and are less likely to visit forests often to walk a dog and to pick forest fruits (mushrooms, berries and chestnuts). On the other hand, respondents in second class expressed positive preferences for having waymarks and information boards maintained. They also expressed positive preferences for having more forest openings, but only up to 2,3% as the utility starts to decrease after this point (square term is also significant and negative). Respondents in this class also expressed positive preferences for deviation from the current state in general (positive and significant constant term. Similarly as those from the first class, they have also expressed negative preferences for having to pay for changes in the attributes.

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Value Chain Analysis and Socio Economic Aspects of Non-Wood Forest Products in Central Serbia

VCA and SEC of NWFPs in Central Serbia

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Keywords: *value chain analysis, non-wood forest products, socio-economy, Serbia*

Introduction

The constant development of the forestry has led to an expansion of the traditional framework in which forestry now has the potential for creating a symbiosis with other disciplines, such as economics, sociology, ecology, and statistics. However, non-wood forest products (NWFPs) (Arnold, 1995) have increased in importance through the expansion of organic production and now are an integral part of modern concepts of bio-economy (Jordan et al., 2007; Birch K. and Tyfield D., 2013) and sustainable development (Hopwood et al., 2005). The study finds that value chain analysis as part of the bioeconomy (Kaplinsky, 2000; Gereffi and Fernandez-Stark, 2011), are evolving and vary depending on the actor, but display similarities such as the emphasis on economic output (Donaldson et al., 2006) and a broad, cross-sectoral focus. Various aspects of the bioeconomy have been increasingly explored (McCormick and Kautto N., 2013). One of those important for forestry, is NWFPs, because the trade of commercially important NWFPs is estimated at 11 billion US$·year^{-1} (Broad et al., 2003) in the world.

A significant part of the rural labor force in Serbia (45-50% of the employed rural population) work in agriculture, while agriculture comprises more than 20% of total employment in the Republic of Serbia (Vukmirović and Smith Govoni, 2008). According to the National Program of Rural Development, the main reasons for the high dependence on agriculture are reduced employment opportunities and low investment activity, especially in rural areas (Keča et al., 2015). NWFPs are very attractive for rural population as an additional source of income (Keča et al., 2013). The current situation in terms of reducing world poverty is a key factor in achieving the double goals of increasing the value of forest resources, by saving wood as a raw material in the forest, and improving the financial condition of the working age population (Gaulli and Hauser, 2011).

Material and Method

This paper focuses on the use of **value chain analysis** (VCA) in buyer–supplier relationships (Dekker, 2003) for coordinating supply chain interdependence for NWFPs. In the management accounting literature, VCA is regarded as a core analytical tool of strategic management accounting (SMA) (Shank and Govindarajan, 1993; Porter, 2008). The VC of NWFPs in Serbia is a "supply driven chain" (Kaplinsky and Morris, 2001) that is characterised by a horizontally-based structure driven by local firms and companies (Keča et al., 2014) which are dependent mainly on private and commercial capital.

There were **149** registered and legal small and medium sized enterprises (SMEs) dealing with NWFPs in Serbia in 2014 (Ministry of Agriculture and Environmental Protection Internal document, 2014). The majority of them (**63**) are situated in statistical region of Central Serbia.

A statistically valid, representative sample of **55 enterprises,** of which 15 were medium sized enterprises, was selected from Central Serbia (Commission Recommendation 2003/361/EC, 2003). The remaining 40 enterprises were small or micro sized enterprises (staff of 10 to 50). All of the companies are private owned. The primary **criteria** for inclusion of enterprises were: 1. SMEs according to Law on Accounting and Auditing of Republic of Serbia (2010), database of Business Registers Agency, 2. more than 10 permanent workers, 3. average annual placement of over 100 t of NWFPs and placement on domestic and/or foreign markets. The response rate was **87,3%**; in that way the research has the **census research** (Pinsonneault and Kraemer, 1993; Bryman and Bell, 2011).

The interviews were structured to address standard questions and prior to each interview the interviewees (owners or general managers of SMEs) were given a full explanation of the purpose of the questioning (Dul and Hak 2008). Face to face interviews were conducted with the leading companies in the field; in other cases, questionnaires (57 questions) were mailed. All interviews which were conducted contained qualitative and quantitative questions (Kothari, 2004).

The **aim** of the study was to analyze VCs and business relations among the companies engaged in purchasing, processing, and selling NWFPs in

Central Serbia. The **foci** of the research (in terms of the analyzed companies) were: income / outcomes, processing facilities, supply, export destination, price (purchase and sale), distribution channels, promotion, business environment, cooperation, and association. The primary use of **parametric statistics** through regression analysis was to determine the **average annual growth rates (AAGR)** (in the purchase, sale on the domestic market and exports) (Altman et al., 2005). Analyses of the results, including t-tests, F-tests, correlations and regression models, were carried out using SPSS 12 (SPSS Inc., Chicago, Illinois).

Results

Regarding the quantity of NWFPs that are processed and placed on the domestic and foreign markets in Serbia (Fig. 1) fungi were the greatest product in the period examined (1993-2014). Fluctuations in annual processed volumes and placements are evident regarding other products, which are affected by several factors including (un)favorable natural factors, and political and economic conditions in the country. Secondary processing and finalization of the product are relatively higher in larger companies that are mostly export-oriented, while smaller companies are reduced to primary processing, largely due to the lack of adequate equipment (Keča et al., 2015), as well as unfair competition that prevails in the market.

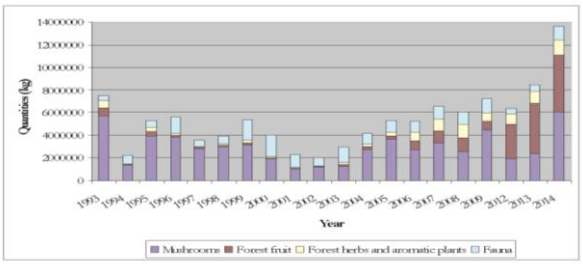

Figure 1: The quantities of processed and placed NWFPs in the market.

The quantities of purchased raw NWFPs in Central Serbia (CS) at 284 purchase stations are unified and based on the total level expressed through a linear trend with strong correlations, significant parameters, and an AAGR of -10,6% (see Tab 1). Products covered by the purchase are: herbs, forest berries, honey and mushrooms.

Table 1: Elements of regression analysis of purchase of NWFPs.

Parameter		*t*	*R*	*F*	Y= -260,15x + 525400	
a	525399,77	3,00	0,748	8,944		
b	-260,15	-2,99			AAGR *(%)*	-10,6

Placement of NWFPs (in tons) on the domestic market also exhibited a negative trend, with an AAGR of -16, and a linear trend (see Tab 2).

Table 2: Elements of regression analysis of placement of NWFPs.

Parameter		*t*	*R*	*F*	Y= -67,509x + 136122	
a	136121,55	3,94	0,829	15,475		
b	-67,50	-3,93			AAGR *(%)*	-16,0

Export of NWFPs (in tons) was also negative, with AAGR of -14,1, a linear trend, strong correlations and significant parameters (see Tab 3).

Table 3: Elements of regression analysis of export of NWFPs.

Parameter		*t*	*R*	*F*	Y= -254,7x + 513829	
a	513828,68	3,475	0,794	11,980		
b	-254,69	-3,461			AAGR *(%)*	-14,1

In summary, the AAGRs decreased for purchases, placements and export of NWFPs from Central Serbia (Fig. 2). Conversely, some products demonstrated a very high market potential (in purchase: Pleurotus osteatus, Cornus mas; in placement on domestic market: Forest honey, Forest fruits, Rosae pseudofructus; in export: vinegar of Malus communis, Rubus ideaus).

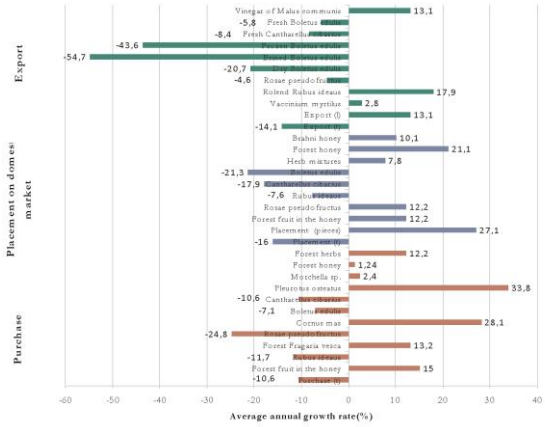

Figure 2: AAGR in purchase, placement and export of NWFPs from Central Serbia.

This study analysed products, companies, and structural elements of VCAs (Fig. 3), using a production-to-consumption system approach, which was focused on the range of activities and transfers involved in the production, transport, distribution and promotion of particular commodities.

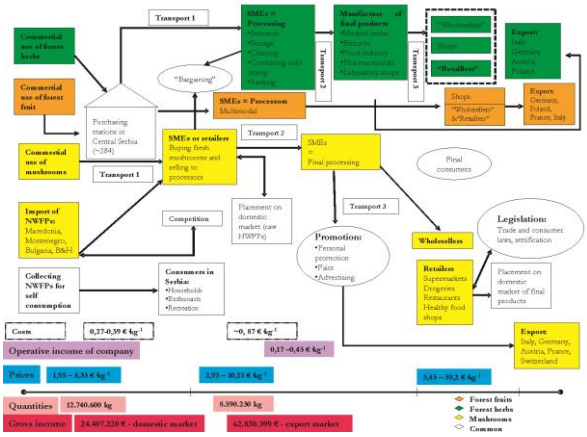

Figure 3: Value chain of NWFPs from Central Serbia.

This "system" is sensitive to numerous factors such as the nature and characteristics of a product, the markets into which they are sold, demand and supply factors (Keča et al., 2013), risks and uncertainties, and how to cope with the possibility of over harvesting.

Discussion

The paper has examined the role of entrepreneurship in NWFPs commercialisation through the lens of value chains in Serbia. As such, VCA is a way of understanding markets and marketing of commodities (Kaplinsky and Morris, 2001). This analysis of NWFPs commercialisation has shown that entrepreneurs are important in the development of innovative marketing of NWFPs along chain through reach to consumers, promotion strategy (Porter, 2008).

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Forest Resource Accounting of South Korea using National Forest Inventory Data

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Keywords: *national forest inventory, Forest Resources accounting,*

Introduction

Forest resource accounting comprises of management tools which integrate forest information from various sources thereby making it useful for policy-making and planning and contribute to the development of natural resource accounts (IIED and WCMC, 1994).

The main objective of this study is to demonstrate how forest resources can be integrated into the national accounts using national forest inventory.

Material and Method

National Forest Inventory covers all forests and the information has been used by all ownership groups for justifying and calibrating their own results. It serves as a central information source and tool for use in forestry, the forest industry and forest environment decisions and policy making (Kangas and Maltamo, 2009).

From the early 1990s, NFIs in many countries began to improve by changing from periodic to a continuous annual inventory system to address international demands for forest resource information as well as to monitor and assess national forest resources and ecosystem. In NFI5 (2006 to 2010) the assessment timeframe moved from a periodic to a continuous annual inventory.

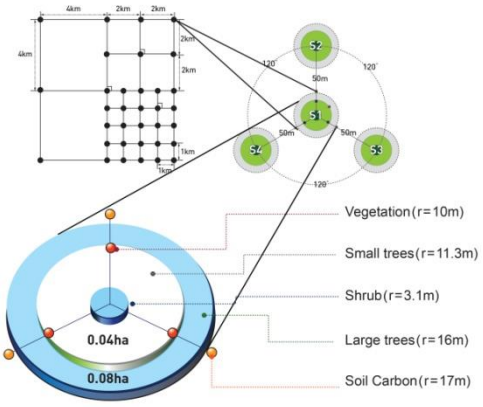

Figure 2. Sampling Design of South Korea.

The field plot design is based on a cluster plot, consisting of four circular subplots. The sampling design adopted in NFI5 uses of four circular subplots (Fig. 1).

In this study, we address three components of value of creation in forests: forest land, standing timber and carbon storage using the SEEA framework for all the South Korea and illustrate how such a framework can be used in policy analysis.

Results

The increased demand for development has led to a decrease in the total forest land area decreased from 6.47 to 6.36 million ha between 1990 and 2010, continuing a slight downward trend in area beginning in the 1990s (Tab. 1).

The forest asset account for forest land according to national inventory data was estimated to be 6,368,643 ha. The Monetary asset account for forest land using hedonic price method amounted to approximately 531 trillion Korean won.

Table 1: Land area of South Korea (1,000ha).

Year	Total land area	Forests	Other land
1990	9,927	6,476	3,451
2000	9,946	6,422	3,524
2010	10,003	6,368	3,635

Source: (Korea Forest Service, 2011)

The growing stock volume of South Korea increased from 38.36 to 125.62 ㎥/ha between 1990 and 2010. The forest asset account for standing timber according to national inventory data was estimated to be 800,025,299㎥ (Tab. 2).

Table 2: Growing stock volume (㎥) of the South Korea.

Year	Growing stock per ha (㎥/ha)	Growing stock			
		Total	Conifers	Broad-leaved	Mixed
1990	38.36	248,426	113,868	64,509	70,048
2000	63.46	407,575	174,941	110,129	122,504
2010	125.62	800,025	336,337	215,369	248,369

The stock of timber resources will increase due to natural growth. On the other hand, the stock of timber resources will decrease over an accounting period through the removal of timber resources and natural losses. The Monetary asset account for

standing timber amounted to approximately 11 trillion Korean won.

The forest biomass using national forest inventory was estimated to be 832 million tons. Opening stocks of carbon are 813 million tC while closing stocks are 861 million tC.

Discussion

This quantitative information is expected to be available from sample-based national forest inventory. Future work is depending on the new sample-based national forest inventory. It will be possible to make many of tables presented when data from sample-based national forest inventory is available.

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Perceptions and Management Intentions of Private Forest Landowners in the Eastern U.S.: Implications for Wood Energy Production

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Keywords: *bioenergy, private forest owners, wood energy*

Introduction

To reduce our reliance on fossil fuels and address global climate change, the United States has invested research and development funds to explore biomass as an alternative green energy source. It is assumed that developing fiber-based energy opporunities holds promise for economic development in rural economies,. Wood-based energy has garnered research funding focused on technology and markets with the hope that it can contribute to reductions in demand for liquid fuels.

Perceptions by some are that the Nation's privately held forests can provide furnish for the development of a woody biofuel industry (Perlack et al. 2005). Since 75 percent of the privately held forests are in the East (315 million acres of 423 million acres in private ownership), we conducted this study in those states conterminous to and east of the Mississippi River.

The research questions were: 1) Will the supply of wood-based biofuel from private forestlands meet the needs of production companies? 2) What are the opportunities and concerns of communities, residents, and existing wood-based industries regarding biofuel facilities? 3) How will communities and residents respond to these opportunities and concerns?

Material and Methods

The mixed method approach employed in this study consisted of Key Informant interviews (KIs) and a phone survey of the general population and private forest landowners (PFLs) in the eastern United States. The KIs were conducted in two counties in each of five states selected to represent the range of forest types, market conditions, and social conditions in the region. Interviewees included representatives from individual PFLs; PFL groups; state resource management agencies; senior local government officials; local planning agencies; local economic development agencies; environmental groups; local media; business owners; local forest industry; nongovernmental organizations; local school districts; and underrepresented or marginalized segment of local society (Wilson 1987, 1996). We conducted approximately 20-30 interviews in each case study site.

All interviews covered a range of topics including major changes in the local economy and efforts to increase and/or retain jobs and income; changes in forest management on ownerships and local quality of life; interest and willingness to use biomass harvesting as a sustainable rural economic development strategy in the area; perceived strengths, weaknesses, opportunities, and threats associated with biofuel production; conflicts over the use and exchange values of natural resources for economic development; and perceptions of understanding by various stakeholders about biomass related issues and energy development and conceptual approaches for informing community members.

The phone survey instrument was developed using the information and insights obtained through the KIs and better captured many of the issues and relationships identified on a local or regional level. Two surveys were conducted – general population and PFLs; the PFL survey is the only survey for which results are presented in this paper. More than 900 interviews were conducted as part of the PFL survey distributed across the study area. The survey included questions regarding the respondents' knowledge of and attitudes about forest management and bioenergy, ownership motivations, past and planned forest management activities, and sociodemgraphic charateristics.

Results

The KIs and survey provided some interesting insights into PFLs regarding their interest in biofuels as an alternative product from their forests. The majority of the paper is focused on the survey results, but the KIs did offer some useful information regarding woody bioenergy. Across the five states where the interviews were conducted, six broad themes were consistently mentioned: landowner rights, economic opportunity, education, markets, environment, and community context. Of particular interest were the comments about landowner rights and education. Regarding landowner rights, respondents believed

that the public should be involved in public land decisions and that there were experts in place to manage those lands. When it came to private lands, however, the interviewees consistently noted that the individual PFL was responsible for making decisions about the use of their land. On education, the KI results identified two critical issues: education about forests is needed for both landowners and the general public, particularly where large in-migration and declining traditional ties to the land was prevalent; and people do not understand biomass and biofuel and are not in a position to make wise decisions about this industry.

The survey allowed for a more focused and quantitative assessment of forest owner attitudes and interest regarding wood-based bioenergy and forest management. The results presented here address owner attitudes and willingness to participate in bioenergy markets. Figure 1 provides responses to the statement "If possible I would harvest biomass for energy from my land", and indicates a strong dichotomy between the respondents. Approximately 50 % indicated that they strongly or somewhat disagree, while less than 45 % strongly or somewhat agreed with the statement. Interestingly, the percentages were reversed when asked if they would harvest only material remaining after other harvests for energy.

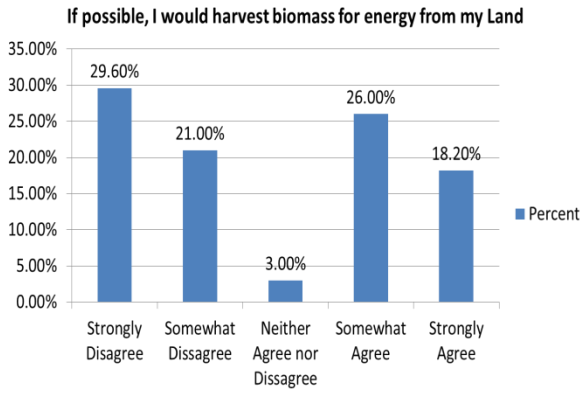

Figure 1: Percent of PFL respondents who agreed with harvest biomass for energy from their property.

Examining simple correlations and developing a logistic regression model between willingness to harvest for biomass and a variety of explanatory variables provides more insights into these relationships (Table 1). Examining the correlations identifies a number of strong relationships between interest in biomass harvests and PFL attitudes and past and planned management actions. Specifically, any type of value placed on the forest property by the landowner, regardless of use or non-use orientation, as well as timber or non-timber plans was positively correlated with a willingness to harvest biomass. Not unexpectedly, knowledge of forest industry or the emerging biomass industry and positive attitudes regarding biomass harvesting were correlated with a willingness to harvest, as was past harvest experience.

Table 1: Correlations and regression results between willingness to harvest for biomass and explanatory variables.

Explanatory Variable	Corr	β	S.E.
Forest Area	0.11**	-.01	.041
Use Values	0.10**	.01	.01
Exchange Values	0.26**	.02	.02
Timber Orientation	0.32**	.04*	.01
Non-Timber Orientation	0.14**	-.04	
Biomass/Industry Knowledge	0.16**	.03	4.90
Biomass Harvesting Attitudes	0.46**	.37***	5.09
Corporation/Partnership	-0.05	-2.94*	8.27
Harvest experience	0.18**	.20	.16
Plan to harvest	0.25**	.10*	.11*
* :p<0.05;**: p<0.01; ***: p<0.001			

The results for the logistic regression were less encompassing but provided some interesting results as well. Only three variables were found to be significant in the final model. The first two statistically significant variables, possessing a timber orientation for future management activities and holding a positive attitude about biomass harvesting, were not surprising and are similar to numerous studies regarding harvesting behavior.

The sign of the third significant variable, respondents who are classified as representing a corporate or partnership form of forest ownership was initially surprising, but is logical upon further examination. A good deal of controversy has been generated around biomass harvests for energy by the traditional forest products industries (solid wood products, pulp and paper), primarily due to concerns over increased wood prices from the added competition (Favero and Mendelsohn, 2014, Guo et al., 2013). As a consequence, many forest products companies, most often characterized as corporations or partnerships, are less likely to respond positively to harvests designed to assist potential competitors, in this case bioenergy producers.

Discussion

This brief overview of the survey results provide some interesting insights into the emerging woody biomass for energy industry. First, many PFLs react very similarly to potential markets for woody biomass as they do to more traditional markets

such as pulpwood and sawtimber. That is, they do not behave as a monolithic group focused solely on profit maximization for their forests. Instead, PFLs in the U.S. exhibit a range of behaviors reflecting multiple ownership and management objectives -- ranging from profit maximization to an emphasis on utility. Developing market opportunities and willing sellers will require much of the same approaches that have been employed in the past – providing market information and technical assistance as needed. Interestingly, the KIs pointed to a recognition by PFLs and others that more education is needed in areas with new residents and/or landowners regarding the utilization of forest resources and it sustainability.

Woody biomass for energy, however, offers a somewhat unique question for landowners. While it can be viewed as another product that produces income for owners, it also represents an opportunity to contribute to the demand for alternative fuel sources, which interests many owners. Conversely, other view this new 'product' as a potential competitor for traditional wood products and may not be willing to participate. Thus, education again may play an important role in defining the role of woody biomass for energy in sustainable forest management.

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Changes in forest sector and its impacts on Slovenia Forest Service

Qualitative analysis of employees' perceptions

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Keywords: *public forest service, New Public Management, Qualitative Methodology, perceptions, Slovenia*

Introduction

In the last two decades Slovenian forest regime passed through important institutional and organizational reforms. The changes affected forest management patterns, ownership rights and social attitude towards forests and forestry (*Forest institutions in transition*, 2005; Kissling-Näf and Bisang, 2001). One of the actors of the new-born regime has become the Slovenia Forest Service (SFS), a state-owned institution that provides public forest service for Slovenian forests irrespective of the ownership. The SFS is responsible for forest management planning, silviculture and protection planning and monitoring, forestry technique, wildlife and hunting management and public relations and education of private forest owners (Debevc, 2005). Financial resources for SFS operation are in great extend allocated from the public budget, thus it is important that the public institution efficiently provides relevant service to its beneficiaries.

For public service to be fully operational and efficient, accurate definition of its role and secured financial resources should be provided. Particularly, the efficient performance of public service is important and it gained attention in the last decade (Andrews and Entwistle, 2013; Boyle, 2007; Jääskeläinen and Lönnqvist, 2011). Moreover, ineffective implementation of preordained policies and inefficient control over policy practices performed by the corresponding public service are considered two most influential barriers of country's social and economic development (Rus, 2001). Thus, straightforward forest policy, designed on a participatory basis, and its efficient and successful implementation could be the most important steps towards improvements. From the perspective of New Public Management (NPM), a public service should aim at improving its efficiency, effectiveness, economy, accountability, quality, decentralization, competitiveness, user-orientation and transparency (Hood, 1991; Vigoda, 2003). In addition, the institutional arrangement, and consequently the management of natural sources, is affected by social and economic changes. Therefore, the question of the SFS's role in the changing environment is an important one and, as such, has not been addressed so far.

In this article we aim at exploring and explaining recent changes in the Slovenian forest sector and their influences on SFS activities. The central questions to be examined in this paper are threefold: a) what changes occurred in Slovenian forest sector in the last decade, b) what impacts on SFS operation were exerted by those changes, and c) what measures should be taken in order to improve the SFS operation. Particularly, we were interested in discovering the issues of efficiency, economy and result-orientation, and SFS adjustment on NPM principles after Slovenia's entrance in the European Union (EU). The focus was given to perceptions of forestry professionals, because we assumed that their position is important basis for shaping quality public service and provision of its services (e.g. Pregernig, 2001).

Material and Method

In this study we employed a qualitative research design, that is considered as an appropriate approach for addressing research questions which request explanation or understanding of social phenomena (Ritchie and Lewis, 2003). The decision for employing a qualitative research design has mainly been influenced by the constructivist philosophical paradigm. We accepted the standpoint that social reality exists independently of our perceptions, theories and constructs, but it can only be discovered by exploring individual views. Those views are captured by means of interviews with open-ended questions, allowing the interviewee to express their views about the phenomena under study (Creswell, 2013). The interviews are a social interaction where the researcher's role is important and might affect interviewee's opinions and reflections.

The sample has been derived from the parent population, which consisted of all the employees at the SFS. The sampling method was purposive sampling, where entities are selected if they meet the pre-defined criteria. The three criteria in our study were: a) at least ten years of working experience at the SFS, b) different occupational position at the hierarchical level, and c) different department at the SFS. The number of selected units in the sample was limited to 7 due to temporal and financial limitations. All interviewees were males. Each interviewee has been assigned a

letter from A to G in order to ensure anonymity. We validated the results by sending the results and interpretations back to the interviewees' inspection and approval.

The interview questionnaire has been designed according to our research questions and theoretical underpinnings (Ritchie and Lewis, 2003). Basically, the questionnaire served as an *aide-mémoire* and the questions were guidelines, rather than rigid questions. Furthermore, we use the questionnaire to design the coding system and analyse the data. The questionnaire was upgraded with the introduction, sub-questions, review of relevant topics to be covered and concluding statements. The core of the questionnaire was composed of three open-ended questions that correspond to the initial research questions.

The interviews were performed between May and June 2015. Interviewees received an email with the description of the research, objectives and request for cooperation. All interviewees agreed for audio recording. The interviews length amounted between 27 and 68 minutes with the average of 42 minutes. All the interviews were transcribed and all transcriptions were sent to interviewees for a pre-check. We analysed the texts with the help of software MaxQDA v.10 (Verbi Software). Codes have been assigned to words, phrases and paragraphs, and were initially extracted from the interview guidelines. During the coding process, we identified new codes/topics and implemented them into the existing coding system. Based on assigned codes and sub-codes, and interpretations of them, we produced logical explanations and confront them with existing theory.

Results

Generally, not many changes in the forestry sector have been perceived by interviewees. The majority perceived that the main changes occurred immediately after Slovenia gained independence and after the current forestry regime has been set. Nevertheless, the majority perceived minor changes occurring constantly in time and space. Particularly, interviewees working daily in the field perceived the decreasing size of forest parcels and expansion of the forest owner number as alarming.

The forest sector in the past two decades has been characterized by the transfer of ownership and management rights to private forest owners. As a result, private forest owners gained accountability and the SFS has been labelled as a supporting link in the supply chain. Basically, the role of the SFS shifted from active managers to management steering and forestry work promoting guides. This was emphasized by the interviewees with more experiences and higher position at the SFS:

"*Forest owners are authorized to manage their forests and they also have the right not to manage it. SFS plays a supporting role or… I think that we must now beg forest owners for doing silvicultural works.*" (Interviewee E)

The topic of entrepreneurship and economics has been perceived as a relevant issue, though from different perspectives. Some interviewees recognized several opportunities of market economy to increase owners' incomes (e.g. interviewee F), others perceived the decreased discretionary power to manage forest development (e.g. interviewee C), and others as a threat for inefficient usage of wood (e.g. interviewee A). Especially younger interviewees were more inclined for profit-oriented attitudes, while the older perceived it as an uncertainty. In this regard, several interviewees mentioned insufficient investments in education and capacity building of foresters in the changing framework conditions:

"*This is a problem, because no one at the SFS ever occupied themselves with those issues and we are not qualified to advise forest owners about those issues.*" (Interviewee A).

Consequently, according to interviewees, the SFS needs to clearly define the priority topics of its future work. Basically, all interviewees perceived a need to bring "*a breath of fresh air*" (interviewee D) to the SFS by either make changes in the policy framework or clarifying the purpose of e.g. forest management planning and silvicultural treatments. Policy changes and adaptations in the past have significantly affected forest management by integrating other policy measures into current forest management plans. Interviewees perceived a radical increase of bureaucratic and administrative tasks, consequently making difficult to perform daily tasks. In particular, interviewees connect this increase with the entrance into the EU. The type and intensity of change effects on SFS operation and activities have been perceived differently.

Changes mainly contributed to decrease the number of workplaces and lower the quality of services provided. Interviewees stressed different consequences of personnel reduction, ranging from insufficient control of forest development, limitation of educational activities, reduced public relations and inefficient field work. Another important issue raised by some interviewees was the technological under-development which had important consequences on the efficient performance of SFS activities. Lack of financial resources was perceived as the main reasons for too slow technological progress:

"*More or less we were able to supply tools and equipment we need, but the world runs much faster than we are.*" (Interviewee C)

Discussion

Even though the interviewees did not perceive major changes in the last decade, those "minor" changes had a strong influence on SFS operation and activities. One of the most noticeable effects was the decrease of financial and human resources which had affected all aspects of the public service. Due to the fact that interviewees have doubts about the purpose of current SFS arrangement might be an alarming signal for low employees' motivation with reasonable consequences on efficiency and quality of performance. Thus, the SFS should change the current objectives and even add new tasks, if it is about to survive in the political landscape (see e.g. Appelstrand, 2012).

According to the interviewees, the potential opportunities and possibilities to increase the SFS operation and efficiency encompass: a) clear definition of SFS purpose and tasks, b) increase the number of educational activities for staff and the general public, and c) improve the tools and technology used. The national forest policy should have a vision of the future development in order to produce arrangements that will fit the expected policy objectives (see e.g. Brukas and Sallnäs, 2012). Educational activities should stress the importance of marketing, production and use of forest products. Finally, technology improvement should be considered for continuous monitoring and improved data collection quality for foresters and the general public (Andreopoulou, 2009).

In general, performing of activities and achieving quality objectives is efficiently carried out only by autonomous and financial independent public institutions (Brukas and Sallnäs, 2012). This is in line with the NPM's principles of decentralization, autonomous operation and economic efficiency (Hood, 1991). Insight into SFS official annual reports reveals that the number of employees and the financial resources for SFS activities decreased in the last decade by 7% and 15%, respectively (Zavod za gozdove Slovenije, 2014). In conclusion, it is safe to say that the SFS will not manage to perform all activities and tasks written in the Forestry Act if, *ceteris paribus*, the reduction of finance and human resources will continue. Therefore, the objectives of the future Slovenian forest policy should be directed into clearly defining the national forest strategy stressing the role of the SFS, thorough improving of the national forest governance and establishing an efficient forest investment system.

The selected methodological approach has been found relevant for studying social phenomena. Despite its temporal and financial difficulties, the approach offers many benefits like e.g. the identification of new aspects and issues perceived by the interviewees. Suggestions for future studies encompass the use of quantitative methods for result validation, the expansion of interviews to service beneficiaries and adding questions for exploring and explaining other NPM principles.

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The Forest Carbon Code in Italy and the carbon credit market
An example of Governance

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Keywords: *Forest Carbon Code, Kyoto Protocol, carbon credit, climate change*

Introduction

In the last four years, a Voluntary Carbon Credit Market (VCCM) has been developed in Italy thanks to the activities carried out by public and private stakeholders (i.e. Carbomark, Carbonsink group srl). Since the beginning, not all the activities carried out in this market have been included in a specific framework of quality standard and referred to all the 'best practices', that would have been necessary to increase the reliability, quality and transparency of all the carbon offset projects.

These good practices[1], based on mechanisms described in the Kyoto Protocol, have been designed by the scientific agency of United Nations Framework Convention on Climate Change (UNFCCC) and by the Intergovernmental Panel on Climate Change (IPCC) and have been recognized by the main and widely used international standards for the VCCM, (i.e. Verified Carbon Standard (VCS) and Gold standard).

Notwithstanding the difficulties in the application of these best practises in VCCM in Italy, all of them have been included in a document, the Forest Carbon Code[2] (FCC) whose main aim is to promote a shared process between private and public actors operating in the context of VCCM.

The Italian FCC defines common guidelines based on best practices used by other Countries in order to realize forestry projects on public and private land. Carbon dioxide equivalent absorbed by these projects can be recognized by the institutional market. Therefore, all project actions can contribute to the achievement of international commitments to tackle climate change in a synergic way.

The activities allowed by the code are: improved forest management, reforestation/afforestation, urban forestation, creation and management of ecological corridors, restoration of previously drained wetland and application of biochar to forest soils.

Material and Method

The Code is a voluntary and self-regulated initiative that aims at defining a legal framework for ownership rights of credits and direct and indirect methods of compensation of forest and agricultural emissions.

The realization project of FCC has been coordinated by Monitoring Carbon Center (NMC), a task force promoted by the Structural Policies Observatory of Agriculltural Research Council and analisys for agricultural economic (CREA), in collaboration with the Forest Observatory of Politic center of bioeconomy of CREA, Tesaf Department of the University of Padova and Compagnia delle Foreste srl.

The version 0.1 of FCC has been published on the website of NMC concurrently with the first meeting that took place in the headquarters of Crea on the 6th November 2012 in Rome. Since then a public consultation has started and voluntary market actors have had the opportunity to provide comments and remarks through a specific on line forum (http://forumco2.ipla.org/), in order to improve the document itself. NMC has collected all the contributions received and, integrating them with the suggestions resulting both during the Roman meeting and in the next seminary held in Padova on the 16th November 2012, has drawned up the version 0.2 of the Code in public consultation on MNC website untill 25th January 2013. The version 0.3 has come out from other two public consultations held in Turin on the 18th March and in Padova on the 16th December in 2013.

Last consultation was held during the seminary of 16 December 2014 in Rome where the most significant actors of VCCM in Italy intervened (Carbon sink Group, Fodazione per l'ambiente Fenoglio, Azzeroco2, Carbomark, etc).

Participants have pointed out the most significant necessities and problems of the market such as:

- The lack of a certification of the generation process and calculation of credits;

[1] IPCC (2003). Good Practice Guidance for Land Use, Land-Use Change and Forestry. Institute for Global Environmental Strategies (IGES), Japan.

[2] http://www.rivistasherwood.it/serviziecosistemici/files vari/notizie/2014/Codice_Forestale_del_Carbonio_1.0-Ottobre_2014.pdf

- The major efficacy and feasibility of local projects;
- The inclusion of all ecosystemic services producted by forests;
- The use of proper registries to avoid the double counting and double remuneration of credits that can derive from their simultaneous use both in institutional and voluntary markets.

These proposals have been taken into account by NMC for the drafting of the version 1.0 of FCC that has been submitted to the Ministry of Agricultural, Food and Forestry Policies who, after confirming its interest in this tool, submitted it to the attention of the Ministry of the Environment and Protection of Land and Sea which set-up an inter-ministerial technical working group on the VCCM in Italy. The Committee met for the first time on the 28th October 2015.

During the first meeting, FCC has been adopted as reference document for the creation of official national guidelines and for the implementation of forest project agents in voluntary market in forest sector.

Results

The analisys of VCCM in Italy reveals that the guarantee systems used by organizations can be of three types:

1. statements released by the intermediation agencies or project managers using internal standards of the first part (declaration of conformity) - e.g. Carbomark ;
2. certificates provided by external organisms by using internal standards of a second part (compliance monitoring) - e.g. Azzero CO2 ;
3. certificates of accredited independent third party institutions by using third-part internal standards (standard certification) - e.g. Carbonsink group

Italian projects managers were found to be informed about instruments for the external verification of project quality but the most of them preferred to apply internal guidelines to contain costs in micro and small scale projects. (Table 1).

In order to incentivize Standard certification projects, the FCC suggests :

- Keeping procedures and certification systems as simpler as possible to allow the economic feasibility of small scale projects.
- Promoting small scale projects through aggregation models (cooperatives associationism etc.)
- Integrating the credit certification with the voluntary certification of good forest management (FSC e/o PEFC);

Discussion

FCC is a tool that incourages the active management of forest, an adeguate planning of public and private forest area thats aims to the improvement of economic, ecological, cultural and social value of forest resources. Specifically the implementation of local projects based on the guidelines of FCC would guarantee : the mitigation and adptation to climate change, ecosystemic services, production of sustainable goods and development of local economy.

From 2012 to 2015 The MNC has been attempting to summarize the situation of the Italian Voluntary Carbon Credit Market (VCCM) generated by forests in projects carried out in Italy or by Italian organizations in the world (public organization, profit organization, Ong ecc.)

The FFC is a mechanism largely adopted as guideline in Italy for the development of voluntary offset programs on national (e.g., CO2Resa) and regional scale (e.g., project FORCREDIT). Its last version has been updated in October 2014 and is available on the website of MNC.

Therefore the FCC could become a tool of Decision Support System in order to define the minimum quality criteria to sell forest carbon credits that can contribute in a synergic way to the achievement of international commitments in the fight against the climate change.

Table 1: Certification and standard used in Italy.

Standard / metodology	ßNeutral	CDM[1]	Carbomicro	Carbonmark	CO2 Resa	CEPK[2]	Guidelines Rina	PEFC[3]	Treedom Standard	VCS[4]	FSC[5]	ISO 14064
Typology of certification (first-part = 1, second-part = 2, third-part = 3)	2	3	1	1	2	2	2	3	1	3	3	3

Source: Our reworking showing what are the main certification mechanisms used in Italy in the last four year and their position in the classification of the standard VCCM; 1.Clean Development Mechanism, 2. Codice Etico Parchi per Kyoto. 3.Programme for the Endorsement of Forest Certification schemes.4. Verified Carbon Standard. 5.Forest Stewardship Council.

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Forestry measures in the RD programs 2014-2020 and the needs in the monitoring and evaluation process

An overview on EU RD plans and indicators

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Keywords: *rural policy, evaluation, forestry measures*

Introduction

On September 2013 a new European Forest Strategy has been adopted by the European Commission, providing a new framework which corresponds best to the increasing demand on forest and to the societal and political changes that have affected forests over the last 15-20 years. Together with the sustainable forest management and the multifunctional role of forests, one of the guiding principles of the strategy is the resource efficiency, which can be evaluated to the extent that all the realized intervention optimizes the contribution of forests and forest sector to rural development, growth and job creation. The forestry measures provided in the new Rural Development Program 2014-2020 (Reg. (EU) 1305/2013) give a contribution to the fulfilment of the basic principles of the EU Forest strategy, having regard to the international and national commitments and to what has been defined in the Ministerial Conferences on the protection of forests in Europe. Forestry is considered as an integral part of the rural development policy and the sustainable management of forests is mentioned as one of the EU priorities for rural development. More specifically, forests are important for several priorities, mainly for Priority 4 (restoring, preserving and enhancing ecosystem dependent on agriculture and forestry) and Priority 5 (promoting resource efficiency and supporting the shift towards a low carbon and climate resilient economy in agriculture, food and forestry sector).

Differently from the previous programming period 2007-2013, the Rural Development policy for 2014-2020 has grouped all the interventions for forests in the Measure 8 (art.21) concerning the investment in forest area development and improvement of the viability of forests. M08 is divided in more sub-measures. Another important intervention for forests is provided by Measure 15 (art.25) concerning the investments improving the resilience and environmental value of forest ecosystems.

All the measures put in place in the last programming period have been proposed in the new RD policy, though reorganized in a more structured way in order to realize integrated projects with a higher value added. Some of them have been merged (i.e. M221 and M223 merged in sub-measure 8.1 or the investment measures M122, M123 and M124 merged in sub-measure 8.6) while others have been proposed again as they stand.

Considering the EU situation, and referring in particular to the specific Italian case, the aim of the work is the analysis of the forestry intervention between the two programming periods in terms of distribution of founds and RD priorities allocation. The monitoring of the financial execution of the last RD programmes and of funds allocation for Measure 8 in the new programming period, shows how the different Member States have decided to use the EAFRD for their forest policy. With regard to the Italian case, the future forest policy framework will be defined analysing the 21 RD plans. In Italy, in fact, Regions are responsible for the management of forest policy and, as a consequence, there are 21 regional schemes. This governance model has the advantage to permit a better use of resources and targeting of measures in accordance with the territorial specificity but, on the other side, it causes a lack of policy coordination at national level. One consequence of the decentralization is that there are different needs and several ways to implement the same measure. The work will resume how the resources will be allocated among forestry measures and priorities, while the comparison with the previous period (made through a table of correlation) will permit to define what will be the direction in the next programming period in every Italian region and what have been the most important changes in the forest policy orientation between the two RD programming periods.

Material and Method

The work is based on the analysis of forestry measures (M08 and M15) in the RD programmes at European and National level.

The first level of analysis is made at European level, comparing the resources allocated for these measures in the different Member States. The information about the support is collected starting by the approved RD programmes (RDP), more specifically considering the factsheets issued by the European Commission for each Member State. In every factsheet the planned budget is allocated

among Priorities and Focus Areas and this help to understand what are the most important objectives of forest policy in the next rural development programming period, both in general and for the single EU Member State.

The second level of analysis focuses on the Italian RDP framework. In Italy there are 21 different RD Plans and, as a consequence, 21 forest policy schemes. The work compare the implementation of measures at the end of the last programming period (in terms of financial execution) and the new policy framework for 2014-2020. All the data concerning the last programming period have been collected by the Italian Rural Network (planned expenditure, modulation, final expenditure, financial execution). Referring to the next programming period, all the forestry measures are grouped in Measure M8 and every region has chosen its own way to plan all the intervention and respond to specific Priorities and Focus Areas. The comparison between the two programming period has been possible thanks to a reclassification of the old measures into the new RD scheme in order to checks how the regional policies for forests located in rural areas have been reoriented and what will be the most important priorities for the future.

Results

Globally, in the European Member States the allocation of funds per measure is 4.6% for M08 (about 6,393 millions €) and 0,3% for M15 (about 365 millions €). The relative importance of the budget for forestry measures on the total planned at EU level is variable. As concern M08, the biggest part of funds are allocated in Spain (32.2%) and Italy (21.4%), followed by United Kingdom (9.7%) and Portugal (8.9%). 41% of resources are destined to reach the aims of Focus Area (FA) 5E regarding carbon conservation and sequestration; 25% for FA4B water management; 22% for FA4A biodiversity, HNV and landscapes. With regard to M15, the biggest part is allocated in Romania (32.3%), followed by United Kingdom (14.6%), Hungary and Italy (14.2%). 75% of global budget is planned for the FA4C (soil management) and 19% for FA4A.

On total, Italian RDPs have planned an expenditure for forest sector equal to 1,370 millions € for M08, allocated mainly to reach the objectives of FA4A (50%) and FA5E (37%). The budget for M15 is about 52 millions €, allocated almost all for FA4A (90%). Globally, the Regions with the highest planned budget for forestry measures are Sicily and Campania (15%) followed by Tuscany (10%) and Puglia (8%). Considering the most important measures implemented in the last programming period, the comparison with the new programming period (Table 1) shows that for some interventions, the planned funds are increased. As concern Measure 221 and 223, the financial execution at the end of 2015 has been very high (94%) but only as a consequence of the high remodulation done during the programming period. At the end of 2015, the budget was 484 million € (-45% with respect what planned at the beginning of the period 2007-2013). One of the unsuccessful measures of the last RD period is Measure 222 concerning agroforestry: the innovative nature of this intervention and the difficulties in the realization of agroforestry systems have determined its failure. In general, the planned budget at the beginning of the new period reflects the amount of resources destined at the end of 2015 as a consequence of remodulation.

Table 1: Planned budget for forestry measures in the RD programming period 2014-2020 and 2007-2013 and financial execution in Italy.

2014-2020	2007-2013	Planned 2014-2020	Planned 2007-2013	Remod. 2015	FE
8.1	221+223	345,459,055	882,702,572	483,772,211	94%
8.2	222	9,058,357	8,186,161	32,500	85%
8.3+8.4	226	526,391,691	435,390,963	550,431,987	84%
8.5	227	322,890,856	257,873,209	257,505,609	78%
8.6	122	165,812,267	219,701,909	120,844,298	91%
15	225	51,642,000	44,048,373	37,118,664	61%

Discussion

The next EU Rural Development Policy gives to the forest sector an increasing role in maintaining biodiversity, offering ecosystem services (most part of the budget is allocated among the Focus Area of carbon conservation and sequestration, water management, biodiversity, HNV and landscapes) but also contributing to the growth of rural areas in terms of income and employment (Focus Area 6).

But the absence of a common legislative network on forestry at EU level complicates again the implementation of the Measures because of the lack in the definition of common standards. Italy is characterized by a similar problem because it has a National Forestry Plan which defines the strategic objectives and instruments but the Regions are responsible for the management of their own forest policies. As a consequence, there are 21 different RD Programmes and management schemes. On one hand this model of governance permits to target the intervention to the specific regional needs but on the other hand there is a lack

in coordination of activities, including evaluation and monitoring.

With respect to the past, some Regions have destined more resources to forest sector while others have decreased their quota. In the same way, the financial resources will be allocated in different ways among the RD measures. It is interesting to note that 50% of budget for forestry measures and 90% of budget for the improving of the resilience and environmental value of forests ecosystem services will be used in Italy to reach the aims of FA4A that concern biodiversity (including Natura 2000 areas and areas facing natural or other specific constraints), high nature value farming and the state of European landscapes. This is important because in the last programming period, some measures of Axis 2 have been unsuccessful as, for instance, the Measure 225 (silvo-environmental payments). Another important contribution is for the FA5E regarding the carbon sequestration and conservation (37% of M08).

With respect to the past, the Italian forest policy orientation seems to recognize in a strongest way the public and environmental services connected to the sustainable management of forests. The efficiency

All the measures has been grouped into one (M08) in order to simplify the administrative burden and allow the realization of integrated projects. This simplification can be strategic especially in the strengthening of the relationships among the different subjects operating in the forestry chain and also in the perspective of a sustainable management of the forests.

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Household composition and aging of forest owners in Japan

Analysis of individual data from the 2000 World Census of Agriculture and Forestry

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Keywords: *2000 World Census of Agriculture and Forestry, forest owner, household composition, aging, generation, planting*

Introduction

A key challenge in Japan's forestry industries is the aging of forestry workers. Statistical analyses have been conducted using data from the National Population Census every five years. For staff of forest owners' associations various analyses have been undertaken using annual statistics on forest owners' associations. Regional analysis of mountain village residents has also been conducted using the National Population Census. However, statistical analysis of population aging among forest owners has been lacking and the methods used previously have only partially addressed the issue.

An important reason for this is the limitations of the survey methods employed in the World Census of Agriculture and Forestry, which has been conducted every 10 years since 1960. The main goal of the Forestry Census is to provide a statistical summary of forest resource concepts, planting activities, and timber production. As the main purpose of Japanese forestry policy was to produce domestic forestry resources through the promotion of coniferous tree planting in the 1960s and 1970s, the government wanted a statistical picture of quantitative changes in planting and cutting activities. This practice did not capture demographic characteristics of forest owners.

However, as a result of postwar forestation policy, the total area of plantation forests exceeded 10 million ha (Matsushita, 2015). According to the national forest resource survey in 2012, the total volumes of plantations and natural forests are 3.04 billion m^3 and 1.86 billion m^3, respectively, and recent annual growth is approximately 100 million m^3 (Forestry Agency, 2015). Some plantation forests have reached their planned final cutting age under initial forest management plans. As approximately 65% and 73% of the area and volume of plantation forests, respectively, are included in private forests, promoting the harvest of private forests has become a key forestry policy objective. Harvesting is the most important decision made by forest owners and, as a result, it is critical to capture the demographics of forest owners.

For private forest owners, only those who engage in both agriculture and forestry are analyzed under the current census system in Japan. Kohroki (2009) and Sato (2013) have analyzed the current situation, but the dataset they used in their analyses included a limited number of households. In the present study, by using data from the 2000 World Census of Agriculture and Forestry, the last national statistical survey of all households owning forests over 1 ha (for survey results, see Shiga (2002)), we analyze the characteristics of households who engaged in both agriculture and forestry, with particular emphasis on the composition and aging trends of the owners.

Materials and methods

We used individual data from the 2000 Forestry Census, the last to survey forest owners exhaustively, regardless of whether they conducted any forestry practices in their forest. In 2005, the methodology of the Forestry Census was completely changed, and the survey target was strictly limited to households that had either conducted forestry practices during the past five years or had a forestry management plan. Since the 2000 Forestry Census does not include household information, this study was linked to the 2000 Agriculture Census to analyze the household composition of the forest owners and the relationship between household composition and planting activities. As the electronic datasets of the Forestry Census and Agriculture Census are not available before 1990, the 2000 census is the only survey with a combined dataset from the Forestry Census and the Agriculture Census.

Our study focuses on forest owners with more than 1 ha of forest who also run farms; there were approximately 660,000 of these enterprises included in the 2000 Forestry Census, holding a combined total of 5.7 million ha of forestland. Included in these records are detailed surveys of the contents of the owners' forest resources and forestry activities, which were inventoried for forest owners with more than 3 ha (approximately 280,000 enterprises in total). We created a combined dataset from the Forestry Census and the Agriculture Census for owners with more than 3 ha.

We considered forest owners to be householders, because the legal definition of a forestland owner

was not specified in the Forestry Census. As it is uncommon in Japan to transfer ownership of forestlands from elderly family members to younger ones before the passing of the elder, this approach is reasonable. In this paper, we define an elderly person as anyone aged 65 years and over.

Results and discussion

Household characteristics

Household characteristics were first identified in terms of age and household composition. The percentages of householders in age-classes 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, and 85 and over were 12.1%, 11.0%, 14.3%, 16.3%, 14.6%, 8.1%, 3.6%, and 1.8%, respectively. Approximately 44.4% of households were over 65 years old. Considering that 81.9% of households exceeded 50 years old in 2000, it is likely that the peak has shifted toward an even older age class over the past 15 years.

As for the numbers of family members, the percentages of one-, two-, three-, four- and five-plus-member households were 3.6%, 21.1%, 16.7%, 13.8%, and 44.8%, respectively, in 2000. However, given the aging Japanese population, the percentage of one-member households has been increasing.

Households comprising one-, two-, three-, or more than three generations represent 21.5%, 35.4%, 37.4%, and 5.7% of the total, respectively. As the percentage of nuclear families has recently been increasing, some three-generation households will likely become one- or two-generation households in the near future.

Households that included only elderly people accounted for 14.6% of the households surveyed. There are concerns that with aging owners and fewer members in most households, conducting forestry activities and handing down necessary knowledge and techniques will become more difficult. One serious consequence of this is that non-recorded information on the boundaries of forestlands may disappear. This will be exacerbated by the fact that the national land survey project is insufficient. Only 41% of mountainous areas had been surveyed by the end of the 2009 fiscal year (Ministry of Land, Infrastructure, Transport and Tourism, 2016).

As we combined the datasets from the Agriculture Census and the Forestry Census, we were able to use data relating to the inheritors of farm management. Here, we can characterize the inheritors of farm management as inheritors of forestland. The percentages of owners who inherited farmland from within their household, from outside the household, or who were not inheritors were 42.9%, 16.1%, and 41.0%, respectively. Inheritors may feel no need to conduct forestry alone (as in the case of forest management), and may choose to simply maintain the inherited forest without carrying on any active practices. This completely diverges from active farm management, and the situation may differ slightly from agricultural practices, but it must be highlighted, as approximately 40% of households have no inheritor. There is a good chance that many of the 16.1% of inheritors that inherit from outside the household will become absentee forestland owners.

Household characteristics and plantation activities

Regarding plantation activities, we can use data on the area of plantation forests with stand ages of 1 to 10 years. This age-class for forests indicates that planting activities occurred during the preceding decade, i.e., in the 1990s. Approximately 29.9% of households planted trees in the 1990s, most of which were conifers such as *Cryptomeria japonica* and *Chamaecyparis obtusa*. Forest owners aged 70 to 74 years old were most active in this regard (32.4% of the tree plantings). The youngest planters comprised the 25- to 29-year-old category, which accounted for 21.7% of the plantings. With regard to other age classes of plantation forests, the percentage of plantings carried out by elderly householders was high. In this sense, the increasing age of forest owners may not influence plantation activities. However, as the population ages beyond 80 years old, age may influence decisions about planting activities.

During the 1990s, households with more members and more generations, households consisting of both husband and wife, and households consisting of only the elderly were more active in planting. On the other hand, solitary forest owners, and especially women and/or owners older than 85, were inactive; 32.8% and 32.4% of households containing 7 or 8+ family members, respectively, carried out planting. Conversely, only 22.3% of one-member households planted. The percentages were especially low for elderly female one-member households: approximately 20.6% (from 65 to 74 years old), 18.3% (75 to 84), and 13.5% (85 and over).

The percentages of householders that conducted silvicultural management, such as planting and/or weeding, during the past year, peaked in the 70–74 age class. Of householders that sold timber during the past year, the peak age was in the 60–64 age

range, 10 years younger than the peak age-class for silvicultural management. This aging tendency will likely influence future timber sales. As for the percentage of householders who sold timber during the past year, categorized by the number of households, one-member households were clearly the lowest. As already shown, the percentage of one-member households is likely to increase in the future and, as a result, timber sales are likely to decrease.

Although farm forest owners face an increasingly challenging aging problem, households made up primarily of the elderly remain more active at planting. Other important characteristics of households also affect their forestry activities, such as the number of family members and the number of generations in one household. Although our results suggest that the aging of householders and the decrease in household size may influence timber sales, a detailed study using current data that is limited to households conducting active forestry is necessary. Our results also suggest that action is needed to promote household forestry activities, including the sale of timber.

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Usage of the Local Multiplier for Decision-making of Management in a Forest Enterprise

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Keywords: *economics, forestry, benefits, local expenditures, economic activities, regions*

Introduction

Forest enterprises are a specific component of the state economy as their economic activity is bound to rural regions. The regional economy describes the economic activities of regions and their differences (for definitions of regional economies see Armstrong and Taylor, 2000; Čadil, 2010; Hájek et al., 2012). We refer to regional economy in this article as the economy of the micro-region, namely it is the territories of the municipalities. Regional localization of the business brings advantages, especially for a local economy (Shuman, 2000; Douthwait, 1996; Kutáček, 2007).

Forest enterprises provide a combination of social and economic benefits for the local economy. The socioeconomic benefits include, above all, cash flows for local entrepreneurs, for supplying products and services to the enterprise, as well as employee salaries. However, the benefits, which stem from the recreational function of forest ecosystems, as well as the tourism revenues, which flow into the region, are also included here. These benefits present additional business and employment opportunities. (Hlaváčková, Březina, 2015). Recreation functions also provide many important benefits and contributions to the physical and psychological well-being (Chan et al., 2012).

The problem is a lack of comprehensive, economic information at the local level, which is confirmed by Silovská (2015). The local multiplier is a suitable tool for determining the economic benefit of a forest enterprise, at least that of direct market activity. It allows for tracking the movement of financial resources in a local economy, and can assist enterprises in determining the contribution of their economic activity to the local economy. Further, enterprise management can change decision-making process due to such analyses and focus more on sustainable development of forestry. Both foreign and domestic authors deal with the topic of local multipliers (Sacks, 2002; Cimadono and Bénassy-Quére 2012; Došek, 2006; Rejmanová, 2014; Březina, Hlaváčková, Šafařík, 2015).

The objectives of the article are to present results of research which focuses on determining the benefits from a forest enterprise to a local economy, and to interpret these results in relation to their usage and management decision-making of the enterprise.

Material and Method

In order to determine the values of the local multiplier, a case study was conducted for the Training Forest Enterprise Masaryk Forest Křtiny (hereinafter "TFE Křtiny").

TFE Křtiny encompasses 10,495 ha, 98% of which is forested. The enterprise is divided into three forest districts – Vranov (3,345 ha of forest land), Habrůvka (7,006 ha of forest land) and Bílovice nad Svitavou (2,920 ha of 3,640 ha forested). (TFE, 2016).

Data from the information system of the TFE Křtiny were used to calculate the local multiplier, specifically the accounting data of incomes and expenditures for the individual forest regions. These data were necessary for calculating the so-called local multiplier LM2; for calculating the local multiplier LM3, it was necessary to survey local employees and suppliers. To clarify, we included only local expenditures. It was necessary to convert Czech crowns to Euros, which was accomplished by employing the average daily nominal exchange rate of the Czech crown against the Euro for 2014 (27.533 CZK/EUR) (CSO, 2016). For more information, see Březina, Hlaváčková, Šafařík, 2015. Data obtained from the survey were processed with basic statistical methods. Interval estimate of quality (p) was conducted to enhance the presentation of the results obtained from a questionnaire survey by using the correction coefficient (k) for random error relative frequencies (OP).

Results

There were 54 suppliers for TFE Křtiny in 2014. Suppliers were 29 legal entities and 25 individuals. The total expenditure on these suppliers accounted for 39% of legal persons and 61% for individuals.

The case study revealed that 30 of the 54 total suppliers were local to TFE Křtiny. TFE Křtiny paid 484,185 Euros to these suppliers, comprising 43.3% of the total expenditures of TFE Křtiny. It

is approximately 57 % of total expeditures on suppliers. The questionnaire survey was completed by 23 local suppliers (76.7%). Further, 57 of the 82 local employees (69.8%) of the TFE Křtiny completed questionnaires. Thus, a statistically significant quantity of suppliers as well as employees was approached. These employees spent more than 155,000 Euros locally, which makes up to 40% of their expenditures.

Values of local multipliers LM2 and LM3 were calculated from accounting data of the TFE Křtiny and from the surveys of employees and suppliers. The LM2 was calculated as 1.23; LM3 was 1.52. This value means that every crown expenditure of TFE Křtiny produces 1,52 crowns for the local economy. These values themselves are not meaningful. It is necessary to compare them with recommended values and those of similar enterprises.

The enterprise can deduce conclusions for improving their decision-making and management at the local level, and strengthen all three pillars of sustainable regional development based on comparisons with enterprises in the industry and region.

Deciding on the nature of expenses may reduce the calculation result and thus strengthen links within the region. Cash flow monitoring will enable the organization to determine its impact on the local economy and understand the local community. Such information obtained may be used in an enterprise setting marketing objectives and strategies, and improving communication with customers, which in turn will increase its competitiveness. It is also possible to use the information obtained to build a corporate culture and improve the relation with employees.

Discussion

The research focuses on the analysis of cash flows forest enterprise to determine how much of the money issued will remain in the area and map the circulation of money spent in the area before it leaves. The results show that the TFE Křtiny spent on local suppliers about 57% of total expenditure on suppliers. Although legal entities are more presented as suppliers, enterprise spends 61 % of expenditures to small suppliers (individuals). From the perspective of local suppliers, the proportion of 91 to 9 in favour of local suppliers in terms of volume of funds.

The stated results lead to reflection about the economy of the monitored organization and about the potential of the given region. The enterprise may assess the actual usage of its internal resources and, in the case of monitoring, the trend of the LM3 values in time to obtain valuable information about changes in the flow of monetary resources, which is also confirmed by Silovská (2015).

Generally, it is possible to notice the economic benefit of calculating the local multiplier to assess increases in regional employment, support of local households and business entities, and increases in the overall local economy of a region. According to Shuman (2000) it would then lead to a return of decision-making processes back to the region and decrease its dependency on external input. Regional politics, then plays an important role here (Armstrong and Taylor, 2000). In addition to the economic benefits, changes in enterprise management will influence the environmental and social profile of an organization.

According to Sacks (2002) if LM2 is from 1 to 2, the LM3 then reaches values between 1 and 3. However, Kutáček (2007) states that realistic value of LM3 is up to 2.20. Both values of the local multiplier 2, or 3 (1.23 or 1.52) appears to be very low in comparison to recommended values, as well those of Březina, Hlaváčková, Šafařík (2015), who applied the method to the National Park Podyjí. It implies that TFE Křtiny management should focus on increasing the share of local suppliers, eventually on education of its employees.

The main objective is to strengthen local economies sustainably provide basic human needs. Another goal is to reduce the difference in social groups and gender, improving respect for human rights and increasing fairness and control in decision-making processes (Hines, 2000).

Effective deciding how to spending is being carried can bring profits to local residents, improving the competitiveness investigated the company and meet the objectives of development policies. If the local economy is impove, the government will be able to expend less resources eg. social benefits. This would allow channeling funds development policies to other areas in the region.

However, both recommendations seem to be problematic. In the case of suppliers, the enterprise must obey the law about public procurement, which forbids it from considering a supplier's location. Influencing consumer behaviour of employees seems to be also problematic, because an enterprise is not able to order them to support of local shops. The only possible solution seems to be a change of regional or national politics and the introduction of tools for support of a local economy.

Since the Training Forest Enterprise Masaryk Forest Křtiny is located near the second largest city of the Czech Republic - Brno, forests provide socio-economic benefits especially in terms of meeting the recreational function which is relate to aesthetic function. Filling recreational and aesthetic functions of forest ecosystems for the economy brings financial benefits in terms of employment and business opportunities.

Local multiplier is one of the potential tools that are used to detect the flow of funds into the local economy of the region and it can help determine the economic benefits of any organization for the region.

The local economy, which has preserved at least part of their local economic linkages (business owned by local people, local production with the use of local resources, local sales and investment of local money back in place) is both less vulnerable to a global economic perspective and also is effective in terms of minor waste of energy and natural resources. Local multiplier is therefore highly application-appropriate indicator of sustainable development.
The research is based on the requirements of strategic documents for increasing the benefit of forestry to rural development. These requirements are set out in international strategic documents (Agenda 21) and national strategic documents (Local Agenda 21). It is a strategy and an action plan for the development of municipalities and regions linking economic and social aspects in the areas of environment in collaboration with the public.
According Johanis (2007) supporting the local economy in this globalized world is necessary because it is threatened by global economic instability and environmental degradation.

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Financial analysis of red deer management in Hungary 1983-2013

Is the more the better?

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Keywords: *commercial hunting, utility of hunting*

Introduction

History

Commercial red stag hunting has played an important role in the rural development in Hungary. From the 1960s commercial hunters were allowed to visit Hungary, which was unique among the communist countries in the so called 'Eastern Block'. The revenue in this sector was generated in convertible currencies, which was of paramount importance, since it could be used in trading with 'Western Countries'. The demand for high quality trophies, as well as the favourable changes in land management and agricultural technology resulted in the continuous improvement of trophy quality in the '60s to the early '80s.

During the political and economic reforms at the early 1990s personal connections through hunting with various decision makers from western countries helped the country in the transition process, as many potential investors had already gained experience regarding the local conditions by that time.

However, the change of political regime brought along new land tenure system and new landowners through land privatization. It also changed the legal regulation and the institutional background of wild game management.

Current regulations

Since 1997 hunting rights in Hungary is bind to landownership, but it can only be exercised on hunting areas exceeding 3,000 hectares. Wild game management units are formed by the landowners with the approval of the hunting authority. The utilization of the hunting rights on these units are subject to the decisions of the landowners, which can be made every 10 years. It can either be used by the group of landowners, or it can be lent to a hunting association or hunting company.

The hunting right holders are obliged to employ wild game management professionals, and it is the right holders' responsibility to compensate for crop damages. They usually provide commercial hunting services in order to cover their costs that are not covered by their membership fees (if they have any such fees), but generating profit is not among their primary business objectives.

The problem area

The economic, social and legal background of wild game management shows large-scale changes in the past decades, but it had no effect on the ever growing populations of wild game species, especially red deer and wild boar. This is not unique to Hungary, similar processes can be observed all around Europe. (Burbaite and Csányi, 2010)

The increasing number of wild game coupled with the rising prices of crops resulted in higher wild game damage, which is the main source of conflict between the landowners and the lessees. As a parallel process the growing population raises questions about its effects on quality. The estimation of red deer population, as well as the trophy quality issues has been on the agenda since the 1980s in Hungary. Fatalin (1988) was analysing trophy quality and found evidences of decline, while Rácz (1987) publishes strong criticism regarding the inaccurate population size estimates.

The cost benefit analysis of deer population can be based on publicly available data sources as it was conducted in Scotland by the Scottish Natural Heritage (Putman, 2012). This study took into account the wide range of impacts from disease transfer to humans to social benefits. Another approach is modelling that involves extended population modelling with economic attributes. For this an example from Norway is presented by Skonhoft et al. (2013). A precise summary of literature and current knowledge on the impacts of ungulates on vegetation is provided by Reimoser and Putman (2014).

This paper is investigating the financial performance of red deer management, and testing whether the continuous growth of deer population can be justified by its growing economic utility.

Material and Method

Data sources

The research questions in this paper is how utility of red stag hunting can be expressed, and how it is distributed over trophy quality. Changes in utility distribution over time is also in the focus of this paper, as well as the financial consequences of the growing red deer population.

To describe the utility of red stag hunting, trophy evaluation records were collected on national level between 1983 and 2013. Data for the year 1993 is missing. Trophy prices were gathered form market leading companies offering commercial trophy hunting in 2013.

Prices are based on the weight of the trophy, and they vary between the different hunting regions. Trophies of the same weight can have different prices depending on where they were bagged. To express the utility of trophies a relative utility function was derived from the price lists of the individual commercial hunting companies.

Each price list was transformed to a relative price list where the price of a 9 kg trophy meant 100 util, and all other vales were calculated relative to that. The average of the respective values at the hunting companies formed the general utility curve used in the analysis.

In order to analyse the relation of the size of the deer population to the financial performance of wild game management the National Game Management Database is used. It publishes the size of the annual harvest and basic financial parameters of the sector on county level.

Trophy classification

For the purpose of this article, trophy weight classes were employed as follows: 'technical' 0-2.99 kg, 'average' 3-5.99 kg, 'good' 6-8.99 kg and 'premium' 9 kg or above. Technical group means trophies that are usually bagged to improve the quality of the deer population, and it is normally the role of the technical staff. Average trophies are the most frequent in the population and the lower part of the trophy class is regarded as cull, the upper part is valued by hunters. Good trophy class contain trophies that are highly valued, and can be commercialized on national market. The upper part of the good trophy class is likely to be awarded with bronze medal. Premium class trophies are put on international sales, and their prices are increasing exponentially with weight. These trophies are awarded with either silver or gold medals in the qualification system. The upper part of the trophy class belongs to the finest red deer trophies in Europe.

Types of analyses

It has to be noted that trophy hunting includes commercial hunting and hunting by the lessees. Although only the former is put on the market, the latter is also included in the analysis, as an increasing number of trophy hunters decides to lease a hunting area.

Using the data of annual harvest in the trophy classes and their respective utility value, the utility can be calculated for the trophy classes over the time period of analysis. The time series can show the contribution of the trophy classes to the total utility, and changes in their proportion can be analysed.

In order to reveal how red deer population size can affect the financial parameters of wild game management, regression analysis is used on the dataset of annual bag of red stag and the income, wild game damage costs and the profit of wild game management.

Results

The calculated utility of red deer trophy classes between 1983 and 2013 is shown on Figure 1. It can be stated that the total utility has an increasing trend over this time period. It is the direct result of the growing population size and the consequently growing annual bag size.

Between 1990 and 2000 a significant drop in the total utility can be observed. It is the result of the political changes and the following transition period.

Good trophies have the highest share in the total utility, which position is maintained through the whole period of analysis. Average and premium trophy classes are equally contributing to the total utility with minor differences until the early 2000s, when they start to separate.

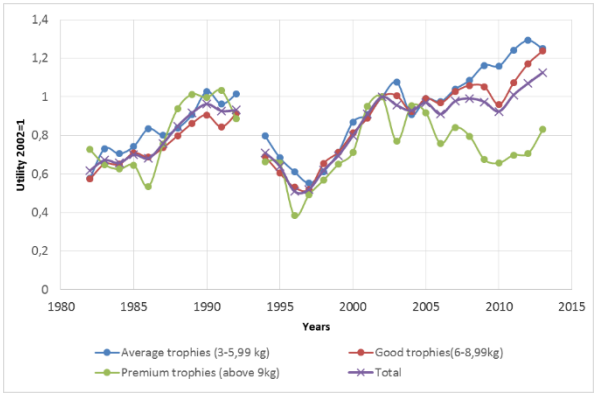

Figure 1: Calculated utility of red deer trophy classes 1983-2013 relative to the utility in the year 2002 within the respective trophy class.

In order to analyse the relationship between red deer population and the financial parameters of wild game management, a regression analysis is used. Since the population size can only be estimated, and the accuracy of these estimations are unknown, the annual bag size of red stag is used as an indicator of the whole population. Among the financial indicators revenue and financial balance are used as the most important ones. Since wild

game management organizations include various types of organizations, and they keep various types of financial records, besides revenue and financial balance only a few cost items are available in the data source preventing a more sophisticated financial analysis.

In the regression model every annual bag of red stag and the respective financial parameters on county level within the period of 2004-2013 are involved. The financial parameters are corrected by inflation relative to 2004.

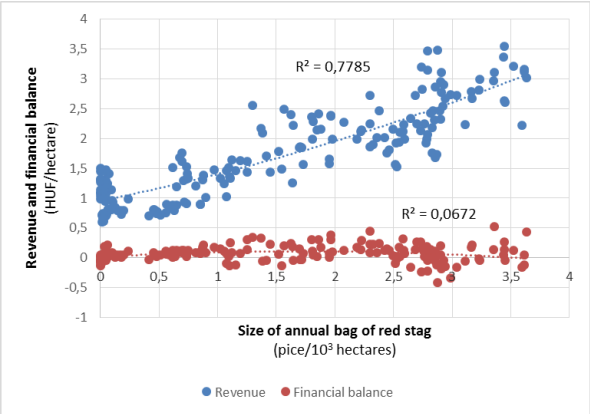

Figure 2: Regression analysis of the annual bag of red stag and the revenue and financial balance of wild game management in the counties in the period 2004-2013.

In both cases a second degree polynomial function was used. In case of revenue the coefficient of determination is 0.7785, which suggests that the red stag population strongly determines the revenues, which is proved to be significant at p=0.001. In case of financial balance, the coefficient of determination is 0.0672, which is insignificant even at p=0.05. Residuals at the latter case shows systematic patterns.

Discussion

The utility of red stag hunting is represented in this paper as the average price of the trophy relative to the average price of a 9 kg trophy in 2013. With this the utility of red stag hunting can be expressed on various level of aggregation.

Taking into account both commercial hunting and the hunting by the lessees, the total utility can be calculated. The aim of this study was to reveal the relationship between the change of utility and the changes in red deer management.

As it can be seen on Figure 1, total utility is increasing, which is the result of the growing annual harvest. The largest share in the total utility is of the good trophy class, which includes trophies between 6 and 8.99 kg. Premium trophies contributing gradually less from the early 2000s. Data is not sufficient to determine, whether the stagnation after 2010, and the increase in the year 2013 is part of a real change, or is just a temporal pattern.

According to the findings above the growth of red deer population does not serve the growth of premium trophies.

The analysis of the relationship between the red stag's annual harvest and the revenue, as well as the financial balance of wild game management revealed that revenue is strongly linked to the annual size of red stag bag. This is supported by the fact that red stag is the most valuable trophy. Another reason of this result is that the occurrence of red deer and wild boar is strongly correlated, which is another important source of revenue.

Financial balance of wild game management is, however, much less determined by the annual size of the bag of red stag. This result of the analysis suggests, that higher deer population require higher costs, and especially higher wild game damage can eliminate positive balance.

In summary the paper revealed that population growth of red deer increases the total utility of trophy hunting, but only through the less favourable good and average trophy categories. The population growth and consequently the grows of harvest contributes to the growth of revenue, but its effect on financial balance of wild game management is not clearly positive.

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Risk-costs in Forestry - Calculation and Impact on Management Decisions

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Keywords: *calculation of risk-costs, survival function, adaptation to risks*

Introduction

With its long production cycles European forestry has to be considered as a long-term investment. Decisions like the choice of tree species or harvest ages fix a huge amount of financial resources and determine the productivity of a forest area for a long time. Therefore tree species and rotation periods have to be carefully chosen in regard to growth conditions and the scarcity of financial funds and forest land.

Basic forestry knowledge tells, that forest stands will face many natural threats (survival risks) during their lifespan. A damage is usually followed by two effects: First of all harvesting costs will in general be higher compared to the regular use as. As well plantation costs etc. will rise for the following stand. This counts especially for storm and fire damages. Furthermore the premature harvest will also lower timber quantities and qualities according to the threat and lower market prices. Summing up we can state that the economic expectations will not be fulfilled in a damage forced harvest.

Material and Method

The probability of failure and the amount of loss have to be considered as main drivers of the expected risk. Therefore the difference in the financial outcome between a normal, risk free development according to the yield table and normal costs, and the expected failure can be considered as standard risk costs. Here, we only analyze the consequences of survival risks, other risks like general changes of the timber markets or uncertain political developments are excluded.

It will be demonstrated how foresters can include survival risks in their calculation schemes when choosing the economic optimal tree species and optimal rotation ages. We have done this by calculating expectation values on the basis of the following data:

Survival probabilities, developed from long term forest damage inventories, expressed by age dependent survival functions.

Amounts of increased costs and lowered income in the case of a damage event, which were determent by a survey within professional foresters and forest owners in Germany.

Using this data standard risk-costs comparing risk free and risky situations and the influence of the respective parameters are quantified.

Results

In general the determination of risk costs have to distinguish between current risk costs of existing stands at specific ages and average risk costs over the whole life span of forest stands. It will be shown, that the determination of economic optimal harvest ages have to face these two risks: The current risk costs of the existing stand and the average risk costs of the potential successor. Thus risk costs can influence the adaption strategy in a different manner, by shortening or by lengthening the harvest age of the actual stands.

Discussion

Our findings show that the knowledge of survival risks and the corresponding risk costs can objectify the handling of risks. This will gain additional importance under the conditions of climate change.

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Economic impact assessment of a forest pest invasion in Uruguay

Main challenges and opportunities

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Keywords: *cost-benefit analysis, Eucalyptus, plant pathology*

Introduction

The forest sector in Uruguay based on exotic plantations started developing in the late 1980s. Therefore, it is a relatively new commercial activity compared with other activities in Uruguay. Forest production is based on *Pinus* and *Eucalyptus* for sawtimber and pulp. *Eucalyptus globulus* used to be the most planted species in Uruguay; however, the area cultivated with this species has been decreasing over the last years. The main reasons have been related to a poor adaptation to soils and climate and the recent unintended introduction of a forest pest, the fungal leaf spot *Teratosphaeria nubilosa*, which affects tree plantations at early ages.

There are countless examples in the literature of introductions of forest pests and diseases in the world (Wingfield et al., 2001; Brasier, 2008; Elmer, 2001). However, internationally there are very few studies that deal with the economic impact of these biological introductions (Holmes, 2010; Holmes et al., 2009), exception of some researches in Canada and the United States.

In Uruguay, despite the growing importance of the forestry sector in the national economic activity, there is no study on the economic impact of any forest pest or disease invasion. The research presented here is part of a project that aimed to evaluate the economic impact caused by the introduction *T. nubilosa* in Uruguay, in order to contribute to the consolidation of the forestry sector from the perspective of economic sustainability. The working hypothesis of the project was that the introduction of *T. nubilosa* in 2007 have had a negative economic impact on *E. globulus* plantations and consequently for the national economy. It was proposed to conduct an economic assessment of the impact of the emergence of *T. nubilosa* in *E. globulus* plantations using a cost-benefit analysis at two levels: the producer level and the national level.

The difference between the application of the method at a national level and the application at a producer level lies primarily in the definition of income (profits) and expenses, and the valuation that will be used at both levels. The project is ongoing and during the implementation of the method, several challenges and opportunities were identified. This paper focuses and elaborates on the application of the cost-benefit analysis at the national level.

Material and Method

The analysis of the economic impact of a change in a sector of the economy can be performed using three different methods: input-output analysis, general equilibrium analysis, and cost-benefit analysis. The latter was selected to conduct this research. The cost-benefit analysis for a national level is used to assess the economic efficiency of the decisions that affect the use of scarce resources (Roche, 2013; Nas, 1996), such as the introduction of a new activity, the disappearance of an activity, the implementation of a policy or regulation in the economy of a country or a region. It is also used to analyze the suitability of a project from the perspective of the economy as a whole. The method seeks to determine the impact of the change in the country's welfare, as measured by the availability of goods and services (OPP, 2014). The starting point for the cost-benefit analysis is the correct identification of costs and benefits, i.e., consider those that will affect the well-being of the economy as a whole and which are generated from the changes in the sector (Roche, 2013).

To conduct a cost-benefit analysis, it is often necessary to correct market prices for distortions caused by taxes, subsidies or monopoly prices, for which accounting prices or shadow prices are used, reflecting the opportunity cost of the use of the resource for the economy (Londero and Cervini, 2003). Shadow prices are obtained by multiplying the market price for a shadow price ratio (SPR), which reflects the opportunity cost of using the resource.

It is often very complicated to calculate shadow prices, usually the Planning Offices or Ministries of Finance or Economics are in charge of calculating the main shadow prices, namely: the labor, the discount rate and the currency (Roura and Cepeda, 1999). Fortunately, in Uruguay, the latest shadow prices estimates were published in 2014 (OPP, 2014).

For this research, a base case scenario was defined as the situation before the pest was introduced. From there, different scenarios were defined

depending on: (1) how much volume was lost due to the pest, (2) the substitution of *E. globulus* by other *Eucalyptus* species. An incremental cash flow was estimated, and the Economic Net Present Value (NPVe) was calculated using a social rate of discount. The NPVe is the sum of discounted net cash flows at a selected discount rate. If the impact of the pest is negative, the incremental NPVe would be negative for the economy; if the impact is positive, the incremental NPVe would be positive; if there is not impact, the incremental NPVe would be zero. The economic analysis in the case of forestry is usually done in a long-term framework because there are usually a few years between the initial investment is done and the first benefit is obtained. Therefore, conducting a Cost-Benefit analysis using cashflows and correcting the values using shadow prices seems to be an appropriate approach.

Data were gathered from different sources: secondary information available and personal interviews with producers and qualified people. Moreover, the interviews were also targeted to get the *E. globulus* sector opinion on the impact of the disease as well as the reasons why the area planted with the species has been diminishing. A seminar with the persons interviewed was organized in order to double check the data gathered and to get missing information from the interviews.

Results

The cost -benefit approach is particularly relevant in the case of forestry projects because these are long-term investments, thus, generates revenues and costs at different points in time which makes comparable in the present (Harrison et al., 2002).

Data availability is a challenge in the forest sector in Uruguay, mainly economic data. In this session, the discussion on the lack of the data is circumscribed to the data needed for this research.

Regarding costs, planting and harvesting costs were identified, i.e. plantation costs, maintenance costs, harvesting and transportation costs. There is not secondary information available. For this research, costs were obtained in the interviews, costs composition were obtained from contractors´cost structures.

Regarding benefits, as it was previously defined, *E. globulus* product exports were the benefits identified in the research. The first problem found was that export prices were not available. However, the Institute Uruguay XXI (a public institute that promotes investment and exports) provided export data in volume and in value, then, a proxy for export prices by product was calculated by dividing exports in value over exports in volume. The data were aggregated by wood type: coniferous and non-coniferous. However, information was available by product, company and destination. Therefore, exporters of *E. globulus* wood chips and roundwood by country of destination were identified. From the interviews it was confirmed that the only species of eucalyptus that is processed in chip mills is *E. globulus*, therefore it was possible to isolate those data.

The second problem found was that wood is exported either as pulpwood or chips. Therefore, industrial costs of processing the roundwood should be included as well. However, modelling pulp industry costs exceeded the scope of this project. Then, for pulpwood, it was assumed that the wood was exported as roundwood as they went to Free Trade Zones, which are considered as "exports" by the country. Therefore, the problem was solved. For chips, two interviews were conducted as only two mills are operating in the country. Although they provided some information, they did not provide with the level of disaggregation needed. This lack of information was a big challenge in the implementation of the method as it was originally planned. Following, some estimates are being done with the information provided but the estimates did not seem reasonable. If adequate estimates are not obtained, revenues from exports of *E. globulus* chips will not be considered.

Labor and currency shadow prices were used to correct for market distortions. As it was mentioned before, Uruguay has recent estimates which contributed to an accurate opportunity cost of using the resources. This information was key to the quality of the results as prices reflect recent economic conditions of the Uruguayan economy.

For labor, it is necessary to identify the opportunity cost of allocating workers to the activity in question rather than allocating them to alternative uses, which are to be employed in another sector or being unemployed. The SPR of semi-skilled labor in the urban interior which is 0.53 was used. This implies that if one unit is spent on labor, the impact on the economy will be less than one.

For currency, the SPR is 1.21. It is indicating that for the country, increasing exports or reducing exports by one currency unit, socially costs 1.21 currency units.

Discussion

The use of the cost-benefit analysis method to estimate the economic impact of the forest pest *T. nubilosa* on the Uruguayan economy is considered

an appropriate method. However, the method implementation presents challenges, mainly related with data availability for the forest sector in Uruguay. It also presents opportunities, related with the estimates the impact of a forest pest on the economy for the first time.

The economic information for the forest sector in Uruguay for this type of research is scarce and incomplete. For the primary sector, plantation costs are not available from secondary information and researchers have to rely on information from contractors. For the industrial sector, the problems are related with costs and with the industrial process.

In addition to the economic data, volumes and areas by species and regions are also lacking. Average Mean Annual Increments (MAIs) by species and regions as well as reliable information on areas by species, age and region are needed in order to learn the impact of the forest pest in areas and yields.

The information identified as important for an economic impact study would be of interest for companies operating in the country as well as investors either from Uruguay or abroad.

Finally, the use of cost - benefit analysis to study the economic impact of a forest pest for the country represents a first step to this type of studies. The environmental impact and the estimation of externalities caused by forest pests should be added in future research. The results would be useful for policy makers to whether to allocate (or not) resources to prevent the introduction of forest pests.

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A development of simulation system to estimate forest profitability including labour requirements, wood supply and growth parameters throughout Japan

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Keywords: *forest planning, forestry profits, growth parameter, labour requirement, wood supply*

Introduction

Under Japanese forestry policy, the requirement for the simulation system has been increased by strategies to more than double national wood supply during the coming 30 years. Therefore, it is important to develop simulation tool that enable wood supply to be increased while economically harvesting forest resources. The objective of the study was to establish a predictive simulator for forestry profitability (Davis et al. 2001; Faustmann 1968), labour requirement and wood supply depending on the future Japanese forestry policy-making.

Material and Method

The simulation system targeting Japanese forest management planning system (Fig. 1) was constructed by combining stand growth simulator, forestry profits models and harvesting allocation tool (Nakajima et al. 2011a, b, c) (Fig. 2).

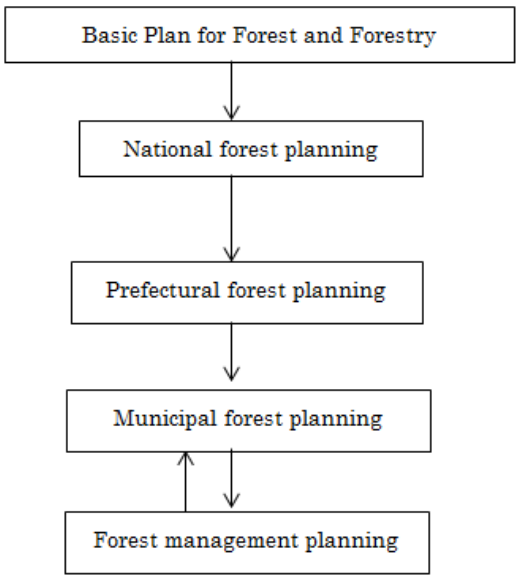


Figure 1: The outline of Japanese forest management planning system.

The data used to estimate growth parameters were obtained from stand yield tables and various sampling field survey. The current subsidy system, which supports stand development of any age (Fig. 3), was applied to the forestry profits model in this study.

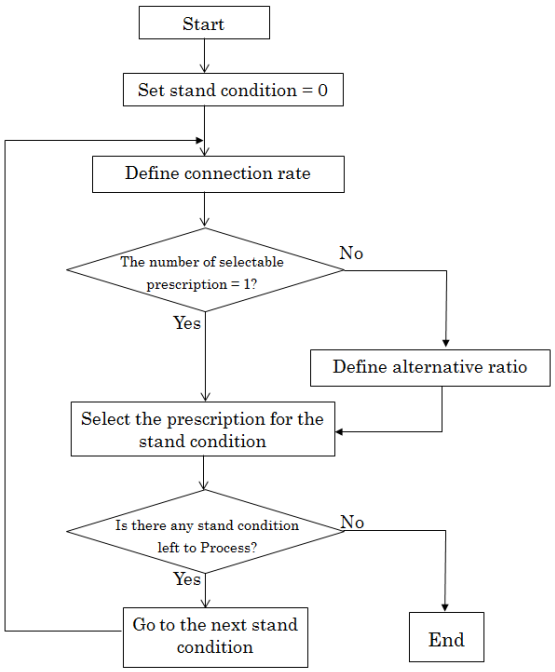


Figure 2: The framework for allocation algorithm of silvicultural practices in each stand.

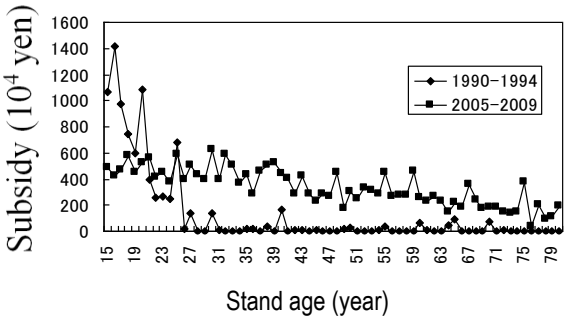


Figure 3: An example of distribution of multi-temporal subsidy system for silvicultural practices.

Based on the simulation system, the future forestry profits, labour requirements and wood supply depending on the Japanese political scenarios were estimated and optimized for forest planning (Bettinger et al. 2001).

Results and discussion

Figure 4 shows the difference of tree height growth patterns derived from parameters obtained from Tohoku and Kyushu regional data. The outcomes of spatiotemporal distribution of harvesting stands derived from the simulation system were shown in figure 5.

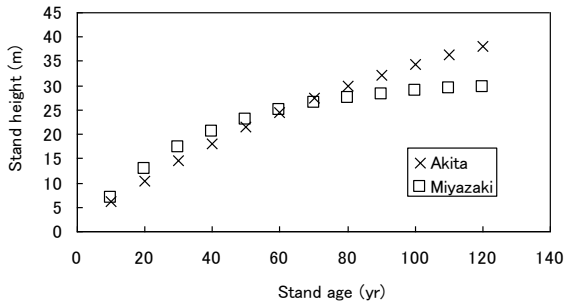


Figure 4: The difference of growth patterns between Japanese north and south regions.

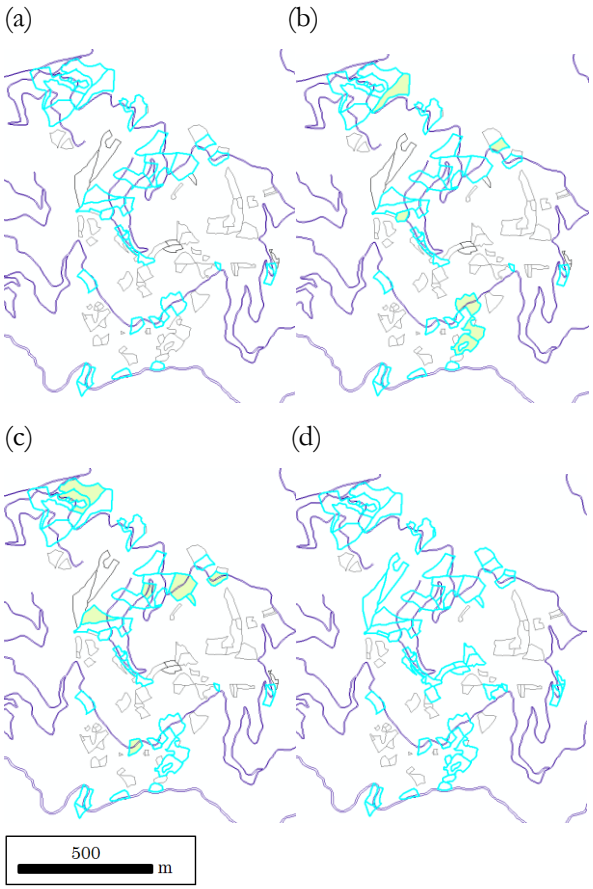


Figure 5: The multi-temporal spatial distribution of harvesting area after 15 years (a), 30 years (b), 45 years (c) and 60 years (d).

The figure 6 shows the relationships between forestry profitability and optimal short-long rotation harvest executing rate. The multi-temporal forestry profitability, labour requirement and wood supply depending on the future Japanese forestry policy-making depending on short-and long rotation executing rate were also simulated (Fig 7) under the Japanese national scale (Fig 8, 9).

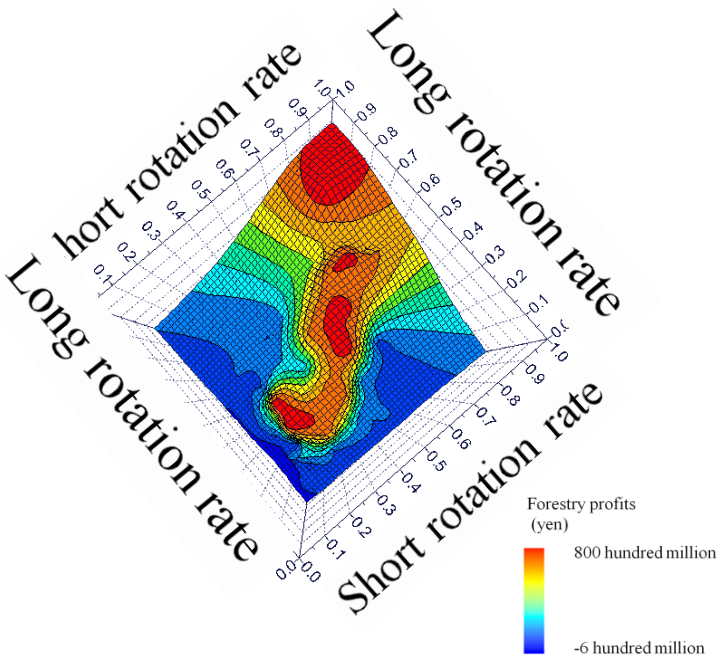
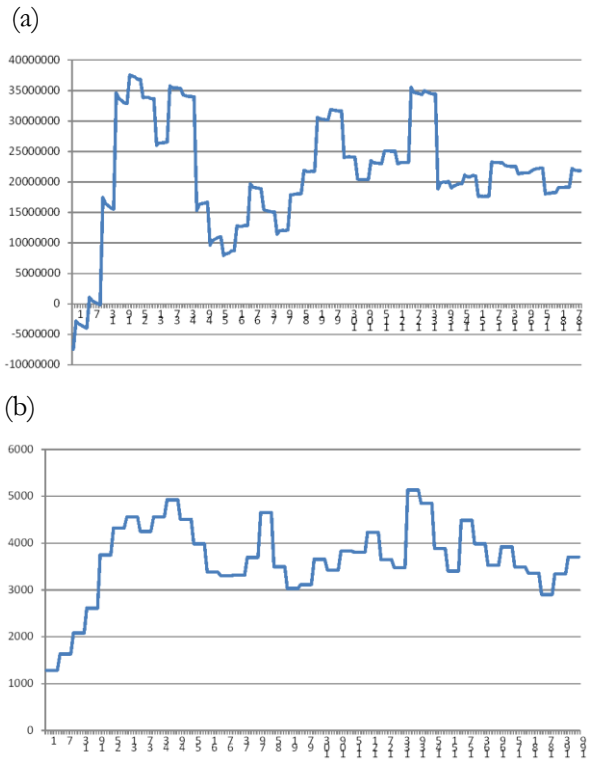


Figure 6: The relationships between forestry profitability and optimal short-long rotation harvest executing rate.



(c)

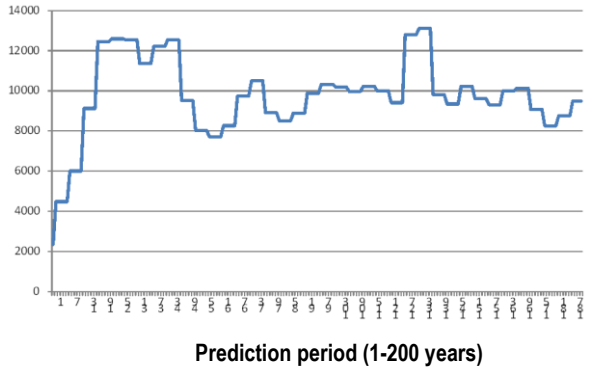


Figure 7: The forestry profitability (yen) (a), labour requirement (person-day) (b) and wood supply (m^3) (c) under a short-and long rotation executing rate.

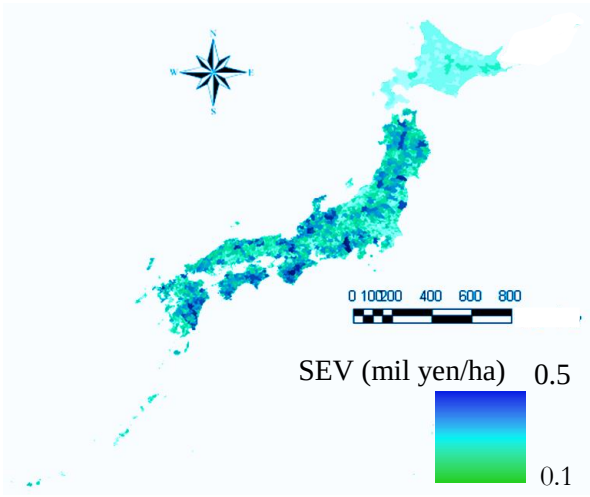


Figure 8: The forest profitability mapping in Japanese regions under a.

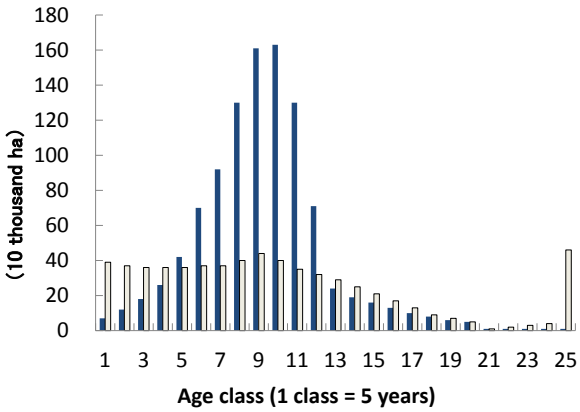


Figure 9: Japanese age distribution and future prediction image. Black and white bar show the current and future age distribution after the time horizon, respectively.

Finally, we also clarified that the current Japanese national plan requires tremendous forestry labours and reduction of reforestation costs is extremely important for forestry profitability under the policy making.

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Exploring challenges to sustainability in the provision of ecosystems services by upland forests in Scotland and Ukraine

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Keywords: *woodlands, rural communities, stakeholder engagement, non-wood forest products*

Introduction

Contemporary societies expect a range of services to be delivered from mountain ecosystems. Their growing societal importance is clearly reflected in policies. The Millennium Ecosystem Assessment (2005) states that people are integral parts of ecosystems and that a dynamic interaction exists between them and other parts of ecosystems. This approach encompasses social, economic and environmental interactions, and the dynamics and cross scale issues that have multiple outcomes. However, multi-functionality is a challenge since the combination of ecosystem services may be very different across different locations and contexts, and dependent on a high number of factors. Stakeholder priorities with respect to individual ecosystem services may also be variable, as may be a range of stakeholders (Sarkki et al., 2015) Reflexive, participatory and multilevel governance, in a continuous process of its adjustment needs to be developed to enable decision-makers to consider existing opinions and behavioural patterns of the diverse stakeholders who drive contemporary changes in remote rural areas, and respond to them (Nijnik and Miller, 2014).

Social innovation (SI) responds to social demands that are traditionally not addressed by markets or existing institutions. It includes new institutional environments (e.g. of formal and informal rules) and arrangements (spatial and procedural), related actors' relationships and interactions (e.g. new attitudes, collaborations, values, behaviours, skills, practices and learning processes) and new fields of activity (e.g. social entrepreneurship, social enterprises). Aiming at improving human wellbeing, SI creates new responses to pressing social demands which affect the process of social interactions. SI manifests itself in new social relationships and collaborations (e.g. processes, interactions, networks), while governance mechanisms based on new social networks advance social capital and can create new SIs (Nijnik et al., 2015).

Social innovations and connected new governance mechanisms can be macro or micro, structural or local, vertical (supply chains) or horizontal (regional), introduced by entrepreneurs and through solidarity, and/or by institutional changes or/and policy reforms (Nussbaumer and Moulaert, 2007). However, whatever is their nature, context or scale, they strengthen actors' ability to respond to societal challenges, such as poverty, food security, and climate change etc. (Lehtonen, 2004). Therefore, SI and enhanced governance are crucial for transition towards Sustainable Development (SD) and for enhancement of smart and inclusive growth of communities living and working in upland woodlands.

Material and Method

This paper seeks to advance both conceptual and practical knowledge and to provide guidance towards solving the problem of implementing the sustainable provision of ecosystem services from Scottish uplands and Ukrainian Carpathian Mountains into stakeholder considerations and policy-making decisions. Research follows a semi-qualitative route. It applies 'face-to-face' questionnaire surveys of respondents and the subsequent application of quantitative methods to identify, analyse and explain a range of attitudes and perspectives, among these respondents (i.e. representatives of local communities and forestry associated stakeholders), regarding multi-functional present and future of forestry in both Scotland uplands and the Ukraine's Carpathians. Stakeholder evaluation involves the application of Q-methodology, i.e. a technique that combines qualitative, participatory approaches, and discourse and concourse analyses, with quantitative, correlation and factor analytical research tools to explore existing challenges for developing multi-functional forestry in the analysed case studies.

Results

The prevailing attitudes of forestry associated stakeholders and local people towards the place of woodlands in livelihoods of the communities living in study areas and the role of woodland development in raising of their well-being were analysed. Stakeholder attitudes concerning access of local communities to obtaining forest multiple ecosystem services, including wood and non-timber forest products, and services, and a range of options for changes in forest policy formulation and implementation, were examined. Important criteria reflecting respondents' perspectives were identified and key factors influencing the attitudinal diversity explained. Findings imply why certain

aspects of the forestry policy, governance and management decisions are unfavourably viewed by some people, and favourably received by others. Results of the analysis carried out in Ukraine show that in a broad sense the economic, environmental, social, cultural and aesthetic functions of forests contribute considerably to the well-being of forest-depended communities in the vicinity of the Carpathian Mountains; while illegal logging is among the main threats to a sustainable provision of forest ecosystem services and the well-being of communities living in the uplands (Melnykovych and Soloviy, 2014). It is concluded that the innovative sustainable forest management practices, community–based management strategies, smart development of forest-dependent mountain territories could contribute to increasing of human well-being and strengthening of community resilience, without threatening sustainability of fragile mountain ecosystems.

Results from Scotland improved an understanding of how the diversity of opinions on forestry changes could influence the selection and evaluation of sustainable forest policy measures (Nijnik and Mather, 2008). The different importance accorded by respondents to the integration of woodlands in rural landscapes, made us aware of public priorities and of factors that can hamper ecosystem based adaptation policies and management practices. At times, entirely opposite attitudes towards forestry practices and the key objectives of the future of forestry in uplands were revealed. However, interviewed people from both countries put strong emphasis on native woodlands regeneration. Attention of respondents is paid to the recognition of the importance of biodiversity conservation and nature preservation, of forest multi-functionality, and people's rights to enjoy the beauty of landscapes. More specific attitudes, the heterogeneity of existing perspectives, and commonalities and differences across stakeholder groups were identified and explained. The general conclusion signified the consensus on an important role of woodlands for the development of upland areas, as offering a range of benefits to people, to the environment and the economy.

Discussion

Our methodological approach went beyond a traditional analysis of public attitudes, as it tend to identify and explain a variety of factors influencing the decision-making, for which our consultation with stakeholders was the first step in promoting of their engagementin decision-making. Selected findings from this paper concerning the heterogeneity of attitudes or on improved participation in decision-making could be of help in preventing and/or resolving potential conflicts and in designing policy measures addressing sustainability in the provision of ecosystems services (including of non-wood forest products) by upland forests and better targeting of forest management decisions. An important question that merits further attention is how to multiply synergies and balance trade-offs (e.g. between forestry and farming; between woodlands expansion and nature restoration; between woody biomass for energy production and ecological sustainability). Also, fostering resilience of upland ecosystems and enhancing their sustainable development necessitate the establishment of an appropriate institutional framework and the encouraging of social innovations, especially with regard to multipurpose forestry, which is likely to be more attractive to people as it can provide additional benefits and can promote sustainable development in marginalised rural areas.

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Economic and Political Power of Domestic Soybean Agro Industries in Forest Areas of Brazilian Midwest

Influences on the planning-use and occupation of land, deforestation, agrarian reform, Indians populations and family farming

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Keywords: *land-use planning, regional productive transformation, forest stakeholders interactions;*

Introduction

Globalized Capitalist Production in agriculture can be characterized by the process in which agriculture, which before was based on the peasants production, supported by heavy agricultural subsidies, in the green revolution, in the government inventory system and had the FAO as it's world reference, began to take shape under the aegis of monopoly capitalism, based on three pillars: the production of commodities, the commodities and futures bourses and world monopolies. These sought to transform the entire agricultural production, forestry and extractive production in goods for the world market. This condition brought new complications for controlling the use and occupation of land, especially in countries where agricultural commodities exports has a strong influence on the performance of the economy, as in the case of Brazil, the world's largest soy exporter in 2014. Soybeans has been one of the most prominent agricultural products by its increasing presence in international trade in the last two decades. During this period, despite a strong movement of concentration and capital denationalization in soybean processing industry in Brazil, we watched the rising of economic and political power of the biggest domestic soybean corporations on specific country areas, with strong implications on traditional communities, Indians, family agriculture, land reform and deforestation. Revisiting the process of capitalist appropriation of the tropical forest area in Brazilian Midwest, under the leadership of these companies, we found that this was mainly guided the political and institutional control of the territory. The analysis of this process and its effects on people and the land are the core object of this work.

Material and Method

This work is part of a collective effort of a multidisciplinary research team of University of Campinas, supported by CAPES in partnership with the Brazilian Ministry of Integration. We used a wide range of qualitative and quantitative research techniques. Initially, a literature review was performed on documents, books, theses and dissertations that discuss agriculture, soybeans markets and the infrastructure and urbanization in Brazilian Midwest. It was also periodically performed document analysis in the reports, newsletters and publications of the stakeholders and its representative organizations involved in the soybeans production chain. Another important methodological resource used to expand the understanding and get a dimension of the process examined were the statistics that show the overview of the production chain, studied area, producers and corporations. Data were collected mainly in IBGE (Brazilian Geographic and Statistical Institute), Crops series and storage statistics by Conab (National Supply Company), Secex (Foreign Trade Statistics) and FAOSTAT (Statistical Division of the United Nations Food and Agriculture). Armed with this set of information, we proceeded two field surveys, which allowed direct contact with a wide range of affected agents in various degrees by the exploitation of agriculture in the forest regions of Brazilian Midwest. Twenty-six semi-structured interviews were conducted in Brazilian States of Mato Grosso, Goiás and the Federal District with rural producers, farm managers, truck drivers, government members, business representatives, trade unions, associations and cooperatives.

Results

The capitalist appropriation of the Brazilian Amazon territory by the soybean crop was followed by an enormous devastation of the natural ecosystem, without major concerns about the consequences this could bring, even for the continuation of production, as well as to the people who lived there or were displaced there to serve as manpower to new ventures. It was possible by the unique knowledge about the political and business dynamics of this regions accumulated by domestic soybean companies, with their power to access and influence the public administration, in the rare occasions that this was not made for themselves. These enterprises ruled the laws and labels that attest to the world the environmental and social sustainability of Brazilian soy, while keep promoting the deforestation, financing the forced and illegal land grabbing under small producers and

Indians, dissolving agrarian reform programs and encouraging monocultures aimed to production of biofuels among familiar farmers. In this survey it was confirmed the hypothesis that the strategies adopted by the multinationals enterprises to expand its presence in the Midwest and grain offer were dependent of the association with domestic companies, that controls the political and institutional dynamics of this regions. The association was beneficial for them once they could share the advantages of the fragile labor and environmental laws, as well as the omission in relation to their supervision, facilitating achievement of social and environmental sustainability labels. Concurrently, even after strong denationalization in crushing and marketing sector, spatial strategies and logistics solutions developed by the group of domestic enterprises, guided mainly on political and institutional control of the territory, enabled these preserve their monopoly over certain regions, inhibiting the advance of multinationals in these spaces, forcing them when decided to do so, to opt for the establishment of partnerships, increasing the economic and political power of national groups on some country areas, especially strengthening the construction of politic institutional arrangements in defence of their interests. This translates into a dual process of territorial monopolies and monopolisation of territories by large national corporations linked to soy. In turn, the analysis of regional strategies developed by these companies, especially those operating in the forest areas of Northern Brazilian States, not only reveal the occurrence, but identified as a key strategic for the development of soy export sector, the completely omission of Federal and State governments and Institutions regarding the land, environmental and labor issues. In 1993 The Amaggi Group created the Madeira River Waterway, established by association with Amazonas State Government. The Waterway opened an outlet for the flow of production to the north and enabled grain production in the Northern and Midwest forest regions, far more than 2500 km of the main ports. Spatially, the result was an explosive growth in soybean production in the Parecis Microregion, the main region of Amaggi operations in Mato Grosso, along the 1990s. In that decade, Parecis were the region that more area added to soy cultivation, nothing less than 1.6 million hectares, from a 20% stake to 30% in the quantity produced and total area of cultivation in the State. In 2002, elected governor, Blairo Maggi, owner of the company, adds political influence to economic power. This allowed an expansion of the ability to crontol funds raised from the federal and state governments, combined with the private companies, including his own, and international loans, such as the International Finance Corporation - private finance arm of the World Bank - used for expansion of cultivation areas projects. The resources earmarked for transport infrastructure projects represented a true invitation to deforestation of the Amazon: new roads, ports and waterways in the heart of the forest. With the rise in land prices in the Cerrado, soy producers could then redirect the advancing agricultural frontier in forest areas, facilitated by roads and illegal access. Concurrently, the Amaggi Group could expand its commercial accumulation spaces, through the supply of credit, seeds and pesticides and the construction of infrastructure for export, so that the territory of control has been the strongest incentive to invest. The group had great responsibility in the 'change' that occurs in the Amazon - was responsible for introducing soybeans in Mato Grosso and boost its expansion into the forest. In the first year of government, the annual rate of deforestation in the state increased by about 30%. The Fiagril Group, in turn, began its activities in the micro-region of Alto do Teles Pires, north central Matro Grosso. The capitalist occupation of the region began from colonization and agrarian reform programs carried out by the military government in the 1970s and 1980. Some aspects become especially difficult setting of the settlers in these programs. Treated of smaller batches, transferred to farmers with no knowledge in the business logic of production in the field, which would have to adapt themselves by reasons that include soil characteristics, which the dryness and lack of nutrients require a number of inputs that they are no able to be produced by subsistence farming, having to turn to the market. The preparation of the soil demands too the use machinery, not included in the credit lines available to settlers. In this scenario, the government, in the person of INCRA - National Institute of Agrarian Reform, was certainly aware of that would have to take some precações to make available to the seated a minimally coherent support structure with these requirements. But what happened was the opposite. Not lacked impetus from the private initiative to dissolve these programs, starting a grooming process, embezzlement and land grabbing in the region, culminating in the expropriation of many settlers and the concentration of land in the hands of a few producers, financial advisors and agricultural technicians involved by many ways in these practices. It is interesting to retrieve the profile and the trajectory of the main shareholder of Fiagril Marino José Franz is agricultural technician and moved to the Lucas region of Rio Verde as

extension of the EMPA-Agricultural Research Corporation, a government institute that worked with soy research and rice. So, the proximity to producers in the region has a long history as well as its presence in the city's political life. In 1997 Mr. Franz also starts his activities as deputy mayor in coalition with Otaviano Pivetta, main shareholder of Cooagril - Cooperative Agricultural and Industrial Luverdense, accused of involvement in a scandal in which four producers were convicted of diverting millions in public grain stocks with the collaboration of the company Cooagril and Bank of Brazil's employees. Later the brother and also a partner of Marino Franz became president of Cooagril. In 2003, the year that Maggi were Elected State Governor, Marino Franz takes Prefecture of Lucas do Rio Verde (city of great economic importance in the region, where Fiagril has its industrial plants) instead of Pivetta and the following year were elected mayor. In 2003, the Governor Maggi launches a program of Public Private Agreements for paving the state highways. The partnership signed were soon from Lucas do Rio Verde to Tapurah. Interestingly, Marino Franz was arrested in 2014 accused of leading a gang of land grabbing in the settlements in Tapurah. The Tapurah/Itanhangá settlement is the second largest in Latin America. It has 115,000 hectares and is endowed with 1,149 lots with 100 hectares each. These are lands of high productivity, located near the towns large grain producers. The researchs proved that the peasants customers of agrarian reform were recruited, coerced and threatened to sell or deliver lots of about 100 hectares, valued at R$ 1 million each. Marino is appointed by the Federal Police as the political and financial arm of the group. According to Marino research acts as a supplier of inputs, pesticides and seeds to farmers members of the alleged criminal organization, as well as actively participate in activities and decision-making among the other members. Fiagril maintained financing agreements with producers established in the agrarian reform settlements in the region to fit the Social Fuel Seal, awarded by the Ministry of Agrarian Development. The group turn to the settlements and encourage the cultivation of soybeans to reach 15% of spending on the family farm require for the Seal. Thus, the state of Mato Grosso that do not have a strong family agriculture, has its agrcultura increasingly commodified. Soybean cultivation in the projects, though often be an economical option, is considered by Incra as contrary to the objectives of agrarian reform (a diversified food production). Sought by CMA - Monitoring Centre for Biofuels - on social and environmental criteria for the purchase of raw material, the Fiagril said purchase soybeans also in the settlements of Mercedes and Tapurah. They recognized that did not take into account legal problems of their partners in trade relations. The plant also said compute all purchases for the purpose of service to 15% of spending on family farms. As a result, it was found that 80% of food consumed in this region comes from other ones.

Discussion

The Midwest is the Brazilian region that best sums up the commercial insertion effort of the country and the way in which modern activities modified the territory, even more rapidly when they come to be controlled by large companies producing to international markets, adapting it to its accumulation needs (Harvey, 2001). Within a decade the Midwest saw redefined its insertion in economic geography (internal and external) for the replacement of old activities based on sustaining the natural economy by the internationalized modern agribusiness production (Macedo, 2010). As these territories were until the 80's true empty lands, the organizations that arrived there needed to diversify its activities in order to structure a range of support services required by the core activity even with respect to basic utilities. The assumption of these functions raised the economic and political influence of such capitals on the rise in these territories, increasing their ability to access public funds and dictate the direction and dynamics of land use and occupation through political arrangements that were consolidate around their interests. For this combination of reasons, this article lends itself to conduct a case study on the performance of the main domestic soy agribusiness corporations in their respective areas of influence in the forest. We are considering the logic of this corporative action since its expansions had a strong impact from the point of view of spatial planning I forest areas, notably by the expansion of the agricultural frontier and the internalization of infrastructure and urbanization. (Miranda, 2013)

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The International Financial Reporting Standards (IFRS) as implemented into the forestry accounting

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Keywords: *International Accounting Standards, fair value, Scandinavian forestry*

Forest industries, which have shares, bonds etc. on the public market place, use the International Financial Reporting Standards (IFRS), and for the accounting of the growing stock of their forests International Accounting Standard (IAS) 41 Agriculture (EU 2009, Herbohn & Herbohn 2006). The market based fair value (FV) is the starting point of the IFRS and IAS 41. The FV uses 'the expected net cash flows discounted at a current market-determined pre-tax rate' if market-determined prices are not available (EU 2009, Herbohn 2009). The FV recognises the changes both in stumpage prices and the growing stock, the last of which are based on the forest management plans (FMP). The FMP relies on and benefits from the long traditions of forest inventories, growth modelling, determining optimal rotation, silvicultural recommendations etc. as well as FMP software using simulation and optimisation etc., all of which have been developed long before fair value accounting (FVA). The final felling happens in the North, say, after 80 years, which implies a certain ambiguity of the stumpage prices and discount rates.

The paper summarizes work on this issue, preliminary ending with questionnaire-based interviews addressing IFRS-practices of Scandinavian forest companies. First, different forestry accounting traditions have been reviewed (Hogg & Jöbstl 2008, Sekot 2007). Second, theoretical bases and consequences of the FVA have been discussed (Argiles et al. 2011). Third, the pros and cons of IAS 41 as documented in the scientific literature have been analysed (Ayanto 2011, Elad & Herbohn 2011). Fourth, the development of stumpage prices has been studied and summarised in the first interview question. Fifth, forest regeneration and other costs have been discussed as well as addressed by questions no. two and three. Sixth, the use of this input information and the FMP are analysed and formulated as the fourth question (Penttinen & Rantala 2008, Penttinen et al. 2004). Seventh, the discount rate dilemma has been analysed and is reflected in terms of a question (Eckel et al. 2003). Even market risk and bare land accounting were inquired as well. Eight, the disclosure of the growing stock has been studied and addressed. Ninth, all closing of the books of the Scandinavian forest industries using IAS 41 have been analysed, covering the periods from 2009 to 2015 (Tornator 2016).

The results document the use of discount rates from 5.5% to 7.5%. It is common practice to report the FV sensitivity with respect to the discount rate, stumpage price and silvicultural cost changes. The prices used are primarily medium term averages of several years, which have even been reviewed by the management and in some cases also by external experts. The typical forecasting period is ten years, and a simple price change percentage is applied thereafter, if any. Some companies estimate discount rates using weighted average cost of capital (WACC) in which the cost of equity capital is based on the capital asset pricing model (CAPM). Also in this context, external experts have been involved in some cases. Risk free interest rate is typically derived from a Euro rate. The interest requirement of the equity capital is updated semi-annually and that of the debts quarterly. Young stands are valued at cost. According to the interviews, the application of IFRS is a quite big but not an impossible burden. However, a comparison between different entities is difficult, because the standard does not provide any exact guidelines. The findings of the closing of the books and interviews are finally summarised and discussed.

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Economic analysis of short rotation plantation investment

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Key words: *forest biomass, investments, profitability, potential*

Introduction

A higher level of energy independence is a strategic interest of each country and hence exploration of the potential of use of alternative energy sources is considered as one of the priorities of sustainable development. The Croatian energy policy is closely linked also with the energy policy of the European Union, which through the Amendment to the Kyoto Protocol accepted at the Conference of the Parties (COP 18) in Doha in 2012, and later COP 21 in Paris, when the commitment to reduce emissions by 20% below 1990 levels by 2020 was agreed upon. Croatia, as an EU member state, is to meet this objective along with other EU member states. Forest tree species biomass can be produced also through intensive cultivation of fast growing species in short rotation cultures (SRC). These types of cultures are fundamentally intended for biomass production as a renewable and environmentally acceptable energy source, yet they can also be an alternative "agricultural" culture (in poor habitats), they can perform a function of diversification of agricultural soil and they provide an opportunity for an environmentally more acceptable way of wastewater and soil purification (phytoremediation). Moreover, they are intended for sequestration of an increased quantity of atmospheric carbon (carbon pool).

Material and Method

Throughout the previous research willow and poplar tree clones showed the greatest biomass production potential in short rotation of up to five years on marginal and especially on optimal soils (Kajba et al. 1998, Kajba and Bogdan 2003, Bogdan et al. 2006). Consequently, testing of diverse clones of willow and poplar trees continued in Croatia, aiming to identify those with the greatest biomass production potential, especially on the so called marginal soil or soil where agricultural production has been abandoned and those that are unattractive concerning the cultivation of more valuable forest tree species (Kajba at al. 1998, Kajba et al. 2004, Kajba et al. 2004, Kajba et al.2007, Kajba and Katičić 2011). Plantations of broad-leaf tree species can be used as pure energy plantations, pre-cultures and mixed cultures striving to produce wood chips for production of short wood fibres and timber to meet the requirements of mechanical wood processing. Such biomass production efforts are in line with global trends that aim to enhance the use of renewable energy sources (Verwijst, 2003, Smart et al., 2005, Volk et al., 2004, Rosillo-Calle, 2007). Biomass implies non-fossilised plant material created through photosynthesis.

Forest biomass is organic matter created in a forest ecosystem, comprising of trees and shrubs used for mechanical and chemical processing, as well as for thermal use as firewood. Wood from trunks, treetops and branches is used upon classical forest exploitation and normally the diameter with bark exceeds 7 cm at its thinnest parts. Hence, up to 70% of wood mass of mature stands is used, while in young stands it can total up to 50% (Sušnik and Benković, 2007.). The allowable cut of 6.5 million m³ in Croatia results in around 2 million m³ of tree trunks (30%), 650,000 m³ of cellulose (10%), 1.3 million m³ firewood, whereas the remainder of around 2.6 million m³ (40%) is small dimension lumber that remains in forests unexploited as waste. Out of the previously mentioned waste 62.5% or 1.6 million m³ could be used for energy production, while 37.5% or almost 1 million m³ would still remain in forests as waste. If 1.3 million m³ firewood is added, one is left with a total quantity of nearly 3 million m³ of wood for energy that could instantly be used on energy market (Tomić et al., 2008). Intensive forest management could increase the annual allowable cut (logging) to reach around 7.3 million m³ which would result in almost 3.3 million m³ of forest biomass for energy, which, compared with the current results, implies an increase of 2 million m³.

Several trial surfaces with fast growing forest tree species have been placed in diverse habitats in Croatia, primarily in lowland Pannonian territory. The research thus far has shown biomass production in short rotation in habitats that are not suitable for cultivation of valuable forest tree species or agricultural crops. The specific objective of the paper is to analyse the cost-effectiveness of short rotation cultures on large surfaces, which is one of the principal prerequisites for successful biomass production from such cultivation from an economic point of view. Consequently, fundamental and additional methods of investment justification evaluation will be explained. Territorial

features concerning climatological conditions, soil features and other data have been taken from previously conducted analyses (Kajba et al. 2012).

The assessment of project cost-effectiveness is shown through several key financial indicators including the projected profit and loss account, cash flow, net financial flow of the project and profitability indicators (payback period, net present value –NPV- and internal rate of return - IRR).

Results

The assessment of project cost-effectiveness considers time preferences which considerably impact on a more realistic and a more accurate project evaluation. Cost-effectiveness assessment is also referred to as a dynamic assessment of effectiveness and hence the following preconditions are used for the calculation of dynamic parameters: project duration of 15 years; a 7% discount rate and an annual increase in prices of 2.9% (average inflation rate in the Republic of Croatia). Investment in short rotation cultures is divided during the first three years, assuming the dynamics of planting 1,000 ha willow plantations per year. The costs of maintenance of short rotation cultures concerning the plant material maintenance (stooling - cutting down trees almost to soil level) and herbicide use, to name a few, are implemented between the second and the fourth year, with anticipated annual costs concerning 1,000 ha willow plantations. Investment in machinery and equipment for wood cutting, export and grinding of wood chips is scheduled to be performed during the third year, while the costs linked with the facility and the maintenance of machinery and equipment for wood cutting, export and grinding are planned commencing from the third year until the project completion. The purchase of new basic resources is envisaged upon the termination of amortisation period. The revenues generated from wood chip production are determined with wood chip valorisation of 30% moisture content, totalling 35 €/t FCO forest road.

The optimal forest rotation is influenced by productivity (quality) of the land, the value of the timber produced, the harvesting costs, taxes and administration costs, forest interest rate and non-timber forest products and services (Posavec et al 2011).

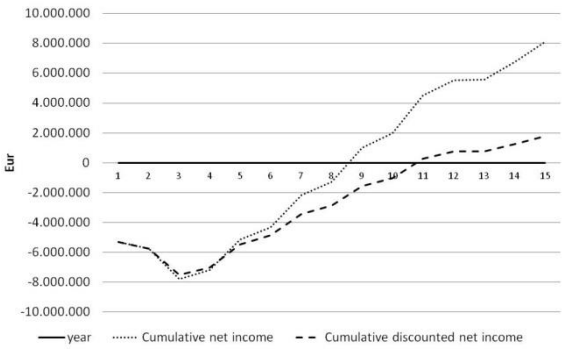

Figure 1: Payback period.

Additional calculation was performed as shown in Table 1 aiming to establish the cost-effectiveness of the investment at diverse discount rates.

Table 1: Net present value trends in relationship with discount rate.

Discount rate (%)	Net present value (€)
5	3.165.707
6	2.443.842
7	1.789.133
8	1.194.414
9	653.379
10	160.464

Discussion

Biomass potential in Croatia is considerably large and it includes forest residue, wood residue in timber industry, firewood, agricultural residues and the biomass collected upon the maintenance of roads and infrastructure facilities. In addition to forest biomass standing at almost 1.6 million m3, which is currently unexploited in Croatian forests in the form of residues, short rotation plantations also have a huge potential. Potential surfaces for establishing short rotation plantations total 1.7 million ha comprising of scarcely pubescent forest land and uncultivated or unsuitable agricultural land. The paper presents a model of organisation of short rotation plantations, commencing from the potential of land consolidation, the procurement of planting material to wood chip production system. The analysis was performed against the backdrop of the results obtained from the research conducted in energy plantations of selected willow clones in the Valpovo-based Forest Office, or biomass production potential depending on the habitat, clones, plant spacing and the structure.

The precondition for project implementation was the establishment of a total of 3,000 ha short rotation plantations of willow, with predicted

annual yield of 21 t/ha. For the purpose of financing and maintenance, as well as logging, taking out and biomass chipping from short rotation plantations a loan was required and hence the loan terms were taken over from the Croatian Bank for Reconstruction and Development loan programmes intended for projects of this type. All the calculated indicators showed the cost-effectiveness of the project: discontinued rate of return: 10.83 years, nett present value: €1789.03, internal rate of return: 10.36% (Table 1, Figure 1)

All the costs have been shown without subsidies and non-repayable funding and the project can be more cost-effective in the event of subsidies provided. Moreover, it has to be highlighted that project duration is not limited to 15 years, as indicated in the analysis and its implementation can be continued. Furthermore, it does not need to be restricted to 3,000 ha as shown in the analysis. Concerning the environmental benefits of biomass in relation to fossil fuels through restorability and sustainability, as well as an almost irrelevant atmospheric burden of carbon dioxide upon the use of biomass fuel and the impact of the project on producers, consumers and the local community, it can be concluded that the project of the establishment of short rotation plantations is economically cost-effective and environmentally and strategically desirable.

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Compensation payments for alternative forest management supporting nature conservation

A case study for Kysuce region, Slovakia, based on single-tree simulator and silvicultural cost model

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Keywords: *annuity, cash flows, Payment for Ecosystem Services, planting costs, shelterwood, transition to selective forests*

Introduction

Compensation payment can allow or support nature protection instead of conventional forest management. It opens opportunity for change in management when no constraint should be forced by legislative restriction. Forest act of Slovakia enables agreement about compensation payments for special purpose forest management which has to be planned by licenced forest planner or by qualified person from nature protection organization (Kulla et al., 2015). Therefore, compensation payment might solve conflicts to decide about optimal forest management regarding ecological and socioeconomic aspects in opposition to "Conventional management" or financially optimal management respectively.

Material and Method

Model territory selected within "Research Demonstration Area Kysuce" (114 ha, 845-1025 m h.a.s.l.) in North-West Slovakia represents real forest protection zone with different degree of forest management restrictions. Forests are dominated by mature even-aged structures, 96% are spruce stands, 52% are more than 85 years old. Several types of management treatments were simulated for individual stands. Management options consisted of these stand treatments. Compensation payments were calculated for change from management option "Conventional Management" (102 ha "Shelterwood", 12 ha "Clearcut") towards "Alternative Management" (transition towards uneven structure of "Selective" forests), "No Management" ("No Cutting" in all region, only financial value of remaining stand considered) or "Forest Reserve" ("Selective" forests in a buffer zone of 67 ha and "No Cutting" in a forest reserve of 47 ha). Compensation payments were calculated from differences between management alternatives regarding annuity for different lengths of contract periods based on method of net present values. Simulation started with stands already existing and used its current age. Therefore, holding value (Deegen et al., 2000) was adequate method more specific than net present value. In this study holding value was used as concept for a time limited value (TLV) for time span of contract period only. Predefined maximum simulation time was 50 years. Calculation of TLV was sum of discounted single net cash flows during contract period and including change of discounted stumpage value of remaining stand during contract period. Interest rate was 2%. Estimation of financial net cash flows of different types of cutting operations was carried out with single-tree simulator Sibyla (Fabrika, 2005). Simulation of stand establishment and young stand development under tending is hardly possible within single-tree simulator because simulation of natural regeneration is strongly influenced by random coefficients and because of absence of integrated cost model for silvicultural operations. Therefore, study integrates financial silvicultural model including costs for planting, pruning and tending (Kovalčík and Kulla, 2015). Time schedules and amount of costs for single silvicultural operations are specific for tree species, site, region and management alternative.

Results

Compensation payments of management options were based on development of TLVs of stand treatments (Tab. 1). TLV in year 0 relates to stumpage value, TLV in following years considers changes in discounted stumpage value and adds sum of discounted net cash flows. When all stand generations in study region were considered, afforestation and tending costs decreased TLV in first three decades for managed options. Decrease of TLV of "Clearcut" was stronger compared to "Shelterwood" and "Selection Cutting" because additional costs were considered for weed and sprout removal, reafforestation and partly for fencing. Decrease of TLV of "Selection Cutting" was slower and lasted longer time due to long regeneration cycle.

Table 1: Development of TLV during simulation period in mean €/ha for reference stand treatment of "Shelterwood", other stand treatments as a difference to reference for each simulation year, applied to study region, considering 1st and 2nd stand generation, including silvicultural costs.

	Reference	Difference to Reference		
	Shelter-wood	Selective Cutting	Clearcut	No Cutting
0	22,702	0	0	0
5	23,008	308	- 227	318
10	23,058	- 40	- 690	378
15	22,221	609	- 117	1,052
20	22,222	663	- 538	889
25	22,169	160	- 643	602
30	22,236	- 74	- 942	73
35	22,316	- 158	- 963	- 594
40	22,392	- 503	- 896	- 1,319
45	22,654	- 638	- 816	- 2,240

Additionally to establishment of new stands, development of timber stocking and timber value of existing stands differed between treatments (Tab. 2). Intensive cutting in "Shelterwood" and "Clearcut" in relation to other options in first two decades temporarily decreased growth potential of standing timber volume and caused lower TLV in this period in relation to "No cutting" and "Selective Cutting". After 10 years "Shelterwood" benefited from additional growth potential on remaining stripe supported by regeneration cut and became financial beneficial better option than "Clearcut". "Shelterwood" also was beneficial compared to "Selective Cutting" because TLV of "Selective Cutting" suffered under carefully and economically too long regeneration cycle, while in "No Cutting" timber quality strongly decreased with time (Tab. 2).

Table 2: Development of TLV during simulation period in mean €/ha for reference stand treatment of "Shelterwood", other stand treatments as a difference to reference for each simulation year, applied to study region, considering only 1st stand generation, excluding 2nd stand generation and excluding silvicultural costs.

	Reference	Difference to Reference		
	Shelter-wood	Selective Cutting	Clearcut	No Cutting
0	22,702	0	0	0
5	23,097	308	7	229
10	23,420	153	- 201	17
15	23,362	92	- 220	- 88
20	23,608	- 49	- 397	- 497
25	23,722	- 381	- 514	- 951
30	23,852	- 603	- 511	- 1,543
35	23,983	- 691	- 523	- 2,261
40	24,081	- 829	- 526	- 3,008
45	24,185	- 838	- 526	- 3,771

Compensation payments of management options (Tab. 3 and 4) resulted from differences of TLVs of stand treatments (Tab. 1 and 2), related to specific stand management of management options and transformed to annuities (Kulla et al., 2015). When all existing and new established young stands in study region, including afforestation and tending costs were considered, only contract period of 35 and more years generated positive compensation payments (Tab. 3).

Table 3: Mean annuity of compensation payments in €/ha/year, difference to "Conventional management", 2nd stand generation including silvicultural costs considered, only positive payments.

Contract period in years	30	35	40	45
Alternative, with 2nd generation		1	14	16
Forest Reserve, with 2nd generation	1	11	32	45
No Management, with 2nd generation		22	48	75

In contrast, contract period of 20 and more years generated positive compensation payments when only stand generations were considered which were existing at the beginning of simulation while young stands regenerated during contract period were excluded from financial calculation (Tab. 4). In second case, in relation to "Conventional Management", after contract period of 45 years compensation payment was 129 Euro per hectare and year for change to "No Management", 25 Euro per hectare and year for "Alternative Management" towards selective forest or 70 Euro per hectare and year for change to "Forest Reserve" (Tab. 4).

Table 4: Mean annuity of compensation payments in €/ha/year, difference to "Conventional management", only stand generation existing at the beginning considered, only positive payments.

Contract period in years	15	20	25	30	35	40	45
Alternative			15	23	24	27	25
Forest Reserve		10	30	42	49	62	70
No Managem.	1	27	47	68	90	110	129

Discussion

Only long contract period enables objective estimation of financial differences between conventional management and alternative opportunities because in short time results were biased by specific developments related to old age structure in study region. Investment costs for planting, pruning or thinning decreased TLV immediately after final cutting. Such investments in future will fully prove their benefits for management goals only on long time span of one complete regeneration cycle after 100 years. Until profitable thinning in newly established stands is not possible they have only negative financial impact on calculation. Net present value or holding

value are able to reflect positive effects of silvicultural treatments for future stand because they consider expected value of stand. In opposition, TLV is not able to reflect such effects caused by limited time horizon of stand simulation. Simulator Sibyla not directly considers differences in stumpage value of young stands regarding silvicultural treatment. Stumpage value of young stands with silvicultural treatment might be underestimated compared to unmanaged young stand. Caused by these reasons, calculation of compensation payments can consider afforestation and tending as not to be carried out to avoid costs when financial income from such investment could not be achieved within contract period, i.e. when contract period is strongly shorter than rotation cycle of management. Only long cycle of one stand rotation will substantial change age and size structure and therefore can support nature protection. Compensation payments for such long contract period can be calculated by considering revenues and costs from all planned future stand generations or from steady state of "Selective" forests/ "No Cutting". In contrast to "No Management" "Forest Reserve" allows introduction of rare tree species in buffer zone and therefore can support change to near-natural tree species composition. Avoidance of "Clearcut" reduces costs for stand establishment and allows for benefits from natural regeneration and natural driven stand development.

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GIS tool for simulation of monoculture tree plantations

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Keywords: *individual tree growth, ArcGIS, python*

Introduction

Studies related to the management of forest monocultures usually rely on data that contains the characteristics of trees over the years. The availability of this data is often restricted. That occurs because it usually depends on the existence of forests belonging to experimental plantations which are costly, occupy large areas and take too long to reach the cutting age, limiting its viability. In Brazil, research in this area such as Demolinari et al (2007) and Leite (2012) are usually carried out with data from companies of the forestry sector.

However, there are situations where observed data is not needed and the characteristics of the forest can be obtained by simulation. Examples can be found in Martins et al (2009) who used a harvester simulator working under different spacing and planting arrangements, Carvalho (2012) that simulated stands structures commonly found in the forestry sector in Brazil and Li et al (2010) who compared tree landscape simulation methods.

Given the above, this study aimed to develop simulating system for forest monoculture within a GIS environment with applicable data for Brazil. The system should be based on individual tree modeling, due to its simplicity of implementation. It should also work as a tool inside the ArcGIS program, since it is a widely used GIS software and allows powerful customizations via programming.

Material and Method

The tests and simulations of this study were performed with the ArcGIS software in Windows environment. ArcGIS has its own library for Python, including all of its main features. The program allows the user to create and customize tools, called Python Toolboxes.

The central idea of this study was to gather in a toolbox a set of easy to use tools that allow the user to generate data of individual trees of a single species spread over an area.

The tools were created using the Python 2.7 programming language. The Spyder IDE was used as the development environment.

The development of the toolbox comprised a modeling system for individual trees, composed by the following modules:

Create Trees – Takes a surface as input and, based on its shape, creates a grid of points (representing trees) for given spacing. It also calculates the total area of the surface where the points (trees) are placed.

Generate Diameters – Creates a field with values of DBH for a set of points representing the trees. It uses random values between 1 and 0 inside a Weibull distribution to obtain the values.

Project Diameters - Projects the DBH of the trees from an initial age to a future age, based on difference equations. For this tool, the Lundqvist-Korf, Schumacher, and Chapman-Richards growth curves are available in the form of difference equations.

Project Survival – Projects the number of surviving trees from an initial age to a final age and clears the DBH of the dead trees at a given age based on the model proposed by Pienaar and Shiver (1981). The trees that are going to be killed are chosen randomly.

Estimate Height – Estimates the height of the living trees using the Lundqvist-Korf, Schumacher, Gompertz, or Weibull growth curves.

Calculate Trees Per Hectare – Calculates the number of trees per hectare based on the number of living trees and the total area.

Calculate competition index – Calculates a competition index for each tree. The index is obtained from the ratio between the DBH of the tree and the value of its corresponding cell on a kriging map based on the DBH of all trees. The index can be used as input in the Project Diameters tool.

The toolbox was tested by simulating a forest stand of 59.2 ha from its second until its seventh year.

Parameters adjusted to *Eucalyptus* sp. at spacings of 3.0 by 3.0 m and 10.0 by 10.0 m were used for the tests of this study. This is a common configuration for planting eucalypt trees in Brazil and it is used from big companies to small farmers.

Results

A toolbox (Simulate Forest) with seven tools arranged in two categories was the final product of the development and programming process (Fig. 1). Each tool has a form to be filled with inputs (numbers and fields) before its execution (Fig 2).

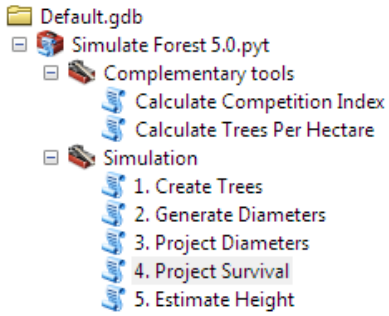


Figure 1: ArcGIS Python Toolbox named "Simulate Forest", containing the seven tools for simulating individual trees.

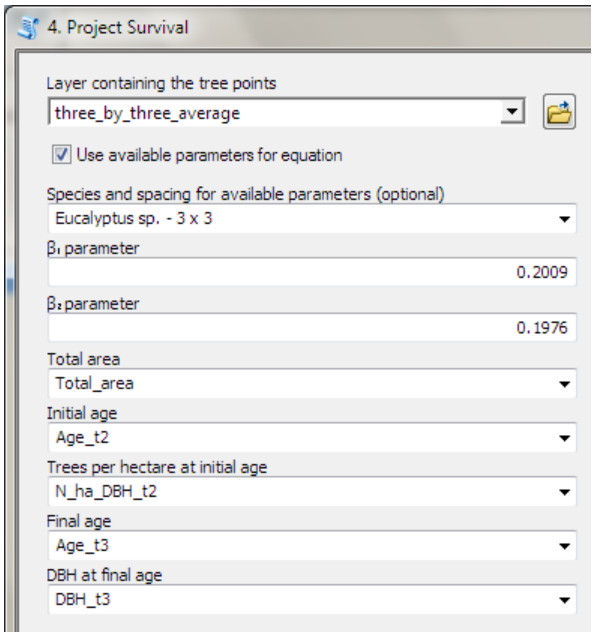


Figure 2: Example of a form filled for the execution of a tool. In this case, the form is for the projection of survival.

A grid of points representing each tree (Fig. 3) was obtained as result from the use of the toolbox. Also, an attribute table linked to the points, containing location, spacing, height, diameter at breast height (DBH) and number of trees per hectare over the years was produced (Fig. 4).

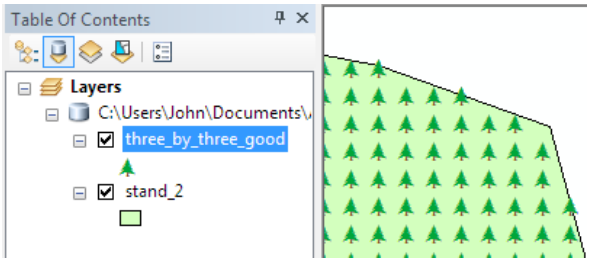
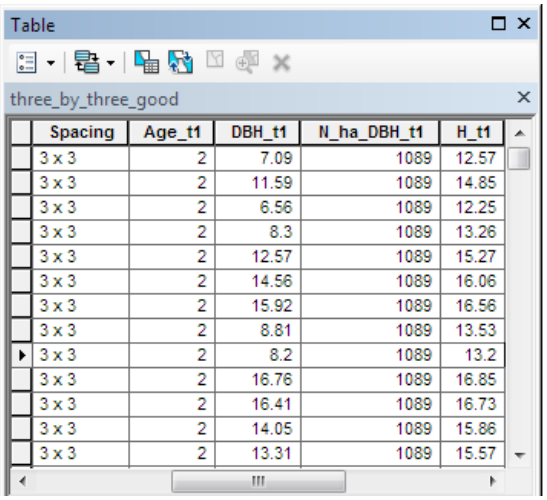


Figure 3: Layers of the grid of points representing the simulated trees and the area where they were placed.



Spacing	Age_t1	DBH_t1	N_ha_DBH_t1	H_t1
3 x 3	2	7.09	1089	12.57
3 x 3	2	11.59	1089	14.85
3 x 3	2	6.56	1089	12.25
3 x 3	2	8.3	1089	13.26
3 x 3	2	12.57	1089	15.27
3 x 3	2	14.56	1089	16.06
3 x 3	2	15.92	1089	16.56
3 x 3	2	8.81	1089	13.53
3 x 3	2	8.2	1089	13.2
3 x 3	2	16.76	1089	16.85
3 x 3	2	16.41	1089	16.73
3 x 3	2	14.05	1089	15.86
3 x 3	2	13.31	1089	15.57

Figure 4: Attribute table of the points representing the trees, showing some of the data generated by the tools.

When exporting the attribute table to Microsoft Excel, it was possible to see, through scatter plots and frequency graphs (Fig. 5), the behavior of the dimensions from the simulated trees over the years.

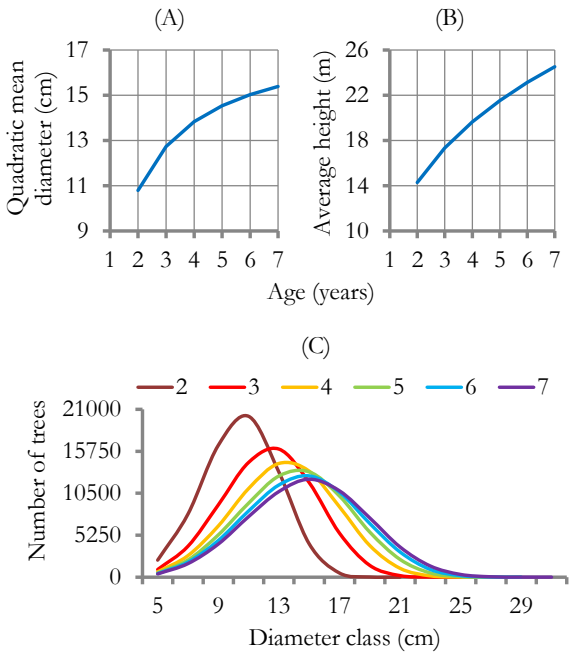


Figure 5: Trends for quadratic mean diameter (A), average height (B) and diameter distributions over the years for the simulated trees.

Discussion

It was seen that the trends over the years for the simulated data (Fig. 5.) were consistent with what is seen in the literature for this type of forest in Brazil. (Leite et al, 2005; Demolinari et al, 2007).

Besides this toolbox, there are other computational programs that simulates forests, such as MOTTI that produces forest information for Finland (Hynynen et al., 2005) and SILVA that models the

growth of individual trees for some European species (Pretzsch et al., 2002). These systems are more complex and provide more detailed information than the system developed in this study.

However, the toolbox "Simulate Forest" does not try to produce a precise simulation of what is found in a particular field situation, but a mass of data consistent with forest growth dynamics for use in studies that can be performed with simulated data. As an example, the tools can be used to generate data to assess the economic impact on a property due to a change in laws linked to the vegetation cover of farms. They can also be used to compare different methods of determining the optimum age of thinning. Or they can be used to compare forest management systems on stand level and individual tree level.

The expectation is that the toolbox will be constantly improved. In addition to the parameters for eucalypt at 3.0 x 3.0 m spacing that were seen in this paper, there are also available parameters for *Eucalyptus* in the spacings 3.0 x 1.0 m, 3.0 x 2.0 m, 4.0 x 3.0 m and 10.0 x 4.0 m. And since obtaining parameters for the simulation of new species is easier in this toolbox when compared to more complex systems, there are plans to provide available parameters for *Pinus* sp. and *Tectonia* sp., as well as new features such as a batch process of all seven tools of the toolbox.

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Forest Accounting at the national level: a comparative assessment of issues and approaches at the example of Austria and Bosnia and Herzegovina

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Keywords: *Integrated Environmental and Economic Accounting for Forests, Economic Accounts for Forestry, Natural Resource Accounting, valuation of the increment*

Introduction

Forestry is quite special in several respects. For this reason, specific satellite accounts have been developed for documenting this sector of the economy at the national level. For the time being, the Integrated Environmental and Economic Accounting for Forests (IEEAF; European Commission 2002) is the respective framework which is to be applied within the EU and has been adopted also by some other European countries. Although the origin of the IEEAF dates back to the late 1990-ies data collection via EUROSTAT started in 2005 only and a second major revision is currently being discussed. Experiences from task forces, pilot studies as well as the ongoing application indicate, that the prospects for sound international comparisons are still limited. Apart from deficits in terms of countries, individual periods or tables compatibility is hampered by different sources of data, alternative interpretations of guidelines and a certain extent of methodological ambiguity. The paper addresses major challenges associated with drawing up the core elements of the IEEAF at the example of two quite different countries: Austria (AT) is a member of the EU since 1995 and has a long tradition in dealing with issues of forest accounting at the national level (Sekot, 2007). Conversely, Bosnia and Herzegovina (BA) is a young state just striving towards EU-membership and started work on forest accounts in 2010 only.

Development and status of forest accounting

The IEEAF superseded the Economic Accounting for Forests (EAF; European Commission 1997) which focused on the generation of income. A 'practical rule' postulated by the EAF-manual allowed to account for the production of timber at the time of harvest so that changes of the growing stock did not affect the income. In line with the requirements of National Accounting, the IEEAF differentiates between forestry in terms of growing timber on the one hand and logging on the other. This implies the necessity to assess the value of the increment as the output of forestry as well as to value the stock harvested as intermediate consumption of logging. Hence, the net increment is considered part of the income generated by the sector. Elements of natural resource accounting are a further extension brought about by the IEEAF. In essence, stock and flow items in regard to forest land and standing timber are to be documented annually in physical as well as in monetary terms. Thus, the IEEAF is consistent with the general requirements of National Accounting in Europe (European Commission, 2013). Whereas the original framework represented a more holistic approach and encompassed a set of tables devoted to so-called non-ESA-functions of forests (elements exceeding the scope of the National Accounts), the actual focus is once more on the generation of income via timber production and natural resource accounting in regard to forests. So far, providing the IEEAF to EUROSTAT is not legally binding within the EU but relies on gentlemen's agreement. However, the elements of natural resource accounting are or at least will be requested by the National Accounts and it suggests itself to represent the industry in National Accounting based on the IEEAF. So far, both countries concentrate on the core economic table 3c (B1), whereas the other tables of the IEEAF are not drawn up and submitted on a regular basis. Elements derived from table 3c of the IEEAF as published online by EUROSTAT refer to the years 2005 to 2014 in the case of AT and to the period 2010 to 2013 for BA. Additionally, Austrian results according to EAF are available for the years 1996 to 2004.

Frame conditions, approaches and results

The frame conditions for forest accounting are quite different in the two countries (see Tab. 1). In Austria, the interrelationships between National Accounting, the Economic Accounts for Agriculture and forest accounting are quite well developed, the EAF still serving as a backbone for establishing forest accounts at the national as well as provincial level (NUTS II). In establishing table

3c (B1) a hierarchical approach is applied, combining data directly available at the national level with aggregates derived from the Federal Forest Enterprise and inferences based on two forest accountancy data networks monitoring smalls-scale farm forestry and bigger private forest enterprises respectively. The empirical evidence is supplemented by expert opinion as regards some specific data deficits. National results for BA have to be aggregated from the two entities (1) Federation of Bosnia and Herzegovina and (2) Republica Srpska. The Federation itself comprises 10 cantons, each of which having a state forest organisation of its own. This administrative structure triggers considerable heterogeneity between the two entities as well as within the Federation itself. Hence, the consistency of information aggregated to the national results must not be overestimated and also the relation to agricultural statistics and National Accounts might be considered questionable.

Table 1: Frame conditions and approaches in regard to forest accounting.

item	AT	BA
ownership (% of area)	~ 80 % private	~ 80 % public
enterprises (% of area, n)	~ 50 %; 144000 small-scale forests (< 200 ha)	~ 80 %; 10 + 1 big state forest organisations
responsibility	1 national statistical office	1 national and 2 sub-national statistical offices
mode of data collection	national accounts sector statistics acc. networks expert opinion	questionnaire addressing 10 + 1 state forest organisations and 142 + 106 private companies
valuation of increment and standing timber	stumpage value	stumpage value

The ratios documented in Table 2 shall indicate the potential for international comparisons. At the same time it should be considered critically, to what extent such comparisons do really allow valid interpretations. The first two items in Table 2 are derived from figures available via the EUROSTAT data explorer as per March 15th 2016. The next four are taken from the 2015 pilot data collection of EUROSTAT (European Commission 2016). The other ratios are calculated on the basis of data provided for a TAIEX-mission conducted in February 2016.

Table 2: Comparison of results derived from table 3c (B1) of the IEEAF for 2013.

item	AT	BA
Compensation of employees in % of factor income	23.0	40.3
Gross fixed capital formation in % of factor income	16.5	4.1
Value added in relation to output	0.5	0.6
Output per annual working unit (€)	151701	38201
Value added per annual working unit (€)	73784	22560
Wages per annual working unit (€)	13898	8144
Share of wood in the rough on total output (%)	53.2	36.9
Share of increment on total output (%)	34.2	52.2
Share of services on total output (%)	9.1	9.4
Share of inseparable, non-forestry secondary activities on total output (%)	2.1	1.3
Net increment in % of increment	10.6	54.5
Output in % of intermediate consumption	194.7	244.2

Common challenges in forest accounting

There is quite a range of questions to be answered and problems to be overcome in order to establish sound forest accounts. Some critical issues are addressed below:

Comprehensiveness of sector statistics: Forestry is defined by activities and there is a certain likelihood, that not all of such activities are captured by the data underlying the accounts for forestry. In AT, for instance, increment is derived from the national forest inventory and timber output is based on the national record of fellings. These sources do not comprise growth and harvest of timber outside of forests e.g. along highways. In the case of BA it is not known for sure, to what extent the answers to the questionnaire encompass tree nurseries, consulting activities or private forestry in terms of output, related intermediate consumption or gross capital formation.

Segregation of forestry: In many cases, sector-specific activities are interrelated with other activities at the enterprise level. In principle, the concept of local Kind of Activity Units (l-KAU) should be applied but there is also the possibility to record inseparable non-forestry secondary activities. In Austria, delimitation of forestry and agriculture especially in the context of farm forestry is a major issue settled according to the l-KAU-approach. However, especially bigger forest enterprises are engaged to a certain extent in timber transport or timber manufacturing the

inputs of which are to be considered as inseparable. The statistical office of the Republica Srpska claims to apply the l-KAU-approach comprehensively, whereas it is not clear, to what extent inseparable non-forestry secondary activities are significant in the different cantons of the Federation.

Valuation of the increment and the intermediate consumption of logging: The differentiation into forestry in terms of growing timber on the one hand and logging on the other implies the requirement to assess the value of the yearly increment as well as of the standing timber harvested. The national forest inventory in AT reports data on the increment every 5 to 10 years only, so that the latest data available have to be held constant until new information becomes available. Dealing with extensive time-lags, the differentiation into assortments as well as the valuation as such is associated with a considerable degree of ambiguity (Sekot, 1998). In future, approaches applied for Carbon reporting may provide the required, physical data for the yearly increment in Austria, but again with a considerable time-lag only. In BA, the forest inventory provides physical data for individual years. However, this information is still lacking validation.

Valuation of the growing stock: The IEEAF suggest several alternative approaches (European Commission 2002). Hence, international comparability may never be achieved. In any case, physical as well as monetary data are associated require a bulk of assumptions. Without national standards the results will remain highly ambiguous and of little significance. Tentative evaluations of the forest assets in Austria demonstrated a methodological variation in the range of +/- 30% (Sekot, 1999). The revaluation item usually outnumbers the yearly output by far; respective examples being associated with factors between 3 and 8. Nevertheless, the analyses may well highlight some interesting issues e.g. in terms of net increment of specific assortments.

Conclusions

The IEEAF is work in progress in terms of the approaches for producing national results but also as regards the general framework as such. The proposed differentiation between priority tables and others is a clear indication of existing gaps and the limited prospects for the availability of comprehensive national datasets.

Improving forestry accounting at the national level in terms of the quantity as well as the quality of data provided is a long-lasting challenge. There is a considerable potential for biases, double counting and omissions. International comparisons are hampered by the different availability of basic data and by the use of different approaches and surrogates. A comprehensive documentation in terms of sources of data, assumptions made and methods applied is a pre-requisite for any sound interpretation of results. Clarifying the interfaces with other sectors of the economy (especially agriculture), the National Accounts and other related statistics (like e.g. UNFCC) are of utmost importance so that the satellite accounts for forestry do fit into the statistical environment. In spite of all shortcomings and problems, the Forestry Accounts are a main, valuable and hardly substitutable element of sector statistics.

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Attitudes, habits, norms and policies regarding co-authorship among forest scientists in Brazil

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Keywords: *communication practices in Forestry and Agriculture Sciences, academic co-authorship, online collaboration, knowledge commoditization, sharing culture*

Introduction

This paper consists of a socioanthropological investigation of forest scientists in Brazil, with a focus on their tools, norms and practices for publishing using co-authorship. Quantitatively it explores the collaborative characteristics of processes, and perceptions of technological, institutional and cultural aspects involved in academic communication, and in particular , in regard to publishing and dissemination activities. Qualitatively, it sheds light on reasons behind the phenomenon of academic co-authorship, by exploring the institutional framework and context among staff members in the Program of Forest Engineering at the Federal University of Paraná, Curitiba - Brazil.

The research aims to follow and expand my previous investigation into communication practices in Forestry and Agriculture Sciences, in which a survey conducted at the ZALF in Muncheberg, Germany (Senna da Costa, 2006) found that almost 90% of its scientific staff were not using online collaborative tools for research communication. Although people declared their willingness to share knowledge through digital platforms, in reality, the absence of a "sharing culture" corresponded with several other excuses, including problems in administrative structures, lack of awareness for communication issues, and a lack of time.

Description of a problem

In the current context of knowledge commoditization, the very role of an author has been made flexible in order to attend to the structures of the scientific establishment. The same could be said about "quality". If originality was once the main criterion of research, it has been replaced by a focus on indexation, undermining traditional scientific capital, and promoting the restructuring of the scientific power through an international publishing system (Beigel, 2014 - p. 759). According to Richard Levins (2010), the social contradictions of our academic institutions are rooted in two main characteristics:

- Institutional organization of the knowledge industry;
- Intellectual biases and constraints of our socioeconomic model.

These characteristics are expressed through the rules regarding recognition, academic promotion, research funding etc, and are evident in the core structures of scholarly life, such as: limits and standards of assessment, rigid hierarchies, and definitions of the domains of journals. All privileges follow a logic based on the interest of the individual and of the owners of content, reinforcing the fragmentation of disciplines. Treating science like a product for sale, it further promotes competitiveness that intends to satisfy the needs of corporations, which can provide an end of employment. It is taken as willful practice, which ends up defining the infrastructure available, as well as the goals and directions chosen by educational institutions when defining their curriculum, work flow and investments (Richard Levins, 2010). An "obvious and deliberate blindness of the organs of 'progress'" or the "basic philosophical incompatibility" of the academic establishment (Boff, 2007).

Material and Method

Case study applying ethnographic approach to the audience made up using a snowball sample technique. Forty six (46) professor-researchers (87% of the whole staff at CIFLOMA/UFPR) answered a questionnaire that included twelve quantitative and six qualitative questions. All interviews, with one exception, were conducted in face-toface meetings, which in terms of ethnographic research provides high quality and reliable data. The interviewees had total freedom to convey their own opinions about barriers and problems involved in collaboration and in co-authorship of scientific works.

The present work takes a "competitive" standard as a characteristic opposed to a "collaborative" standard. But considering scientific collaboration a social phenomenon, the research characteristic or quality depends on the context, which here, is analyzed according to three interdependent dimensions:

- Cultural
- Institutional
- Technological

Results

The data from this research shows how a set of institutional norms reinforces a general set of attitudes. In the race for funding, for instance, professors and institutes are encouraged to multiply the number of their projects and topics, neglecting the quality of the existing initiatives, and amplifying the structural fragility of their efforts as a whole. Furthermore, the absence of mechanisms to value work within teams, produces a chain of effects on knowledge policy, administrative standards and a set of behaviors.

The answers about the role of competition support the mentioned schema. In a private company, competition is perceived as a good motivational aspect of work. However, in public universities, the same spirit of concurrence is said to be counterproductive. Almost all interviewees recognized the existence of an "anomalous spirit of concurrence among colleagues" (36th. Interview), while also agreed that a lack of competition can be a disincentive. Three interviewees related to this as an "autophagic process", relating the absence of counter strategies to limit the spirit of concurrence, which then produces an attitude that harms thes collective spirit imbued at public universities.

All interviewees with administrative experience also blamed unclear policies regarding wages for a progressive devaluation of real income of public universities' professors and workers. As a consequence, consultancy work for private companies is complementing professors' salaries, and thus is another factor that contributes to the spirit of competition. Some of the interviewees refer to such practices as "a form of privatization of the public investment / infra-structure" (35th. Interview).

The data collected from the interviewees showed that the framework guiding their decisions concerning paper writing center around the number of papers they can produce, and the index of publications. There is enough evidence to show that the institutional context shapes individual behavior and work habits in what they concern publishing, coauthoring and collaborating.

Furthermore, no one is assigned to work within teams, or is rewarded for taking part in any real network, even locally. As a result, individualism naturally rules. This relates to an ideological aspect as well, which encompasses the dispute between two opposed attitudes that apply either to individuals and institutions. They can be better represented graphically as follows:

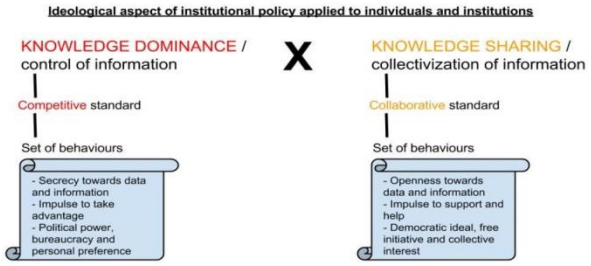

Figure 1: Ideological schema for individuals and institutions (Senna da Costa, 2014).

Discussion

The problem against collaboration at academic environments seems to be a result of a sum of factors. The cultural and institutional drivers clearly prevail in terms of shaping attitudes and procedures. Technology, by itself, does not change the way people work, and when it does, it entails an entire set of cultural and institutional norms going along with it.

The results confirm that the potential for further developments in communication processes among scientists is a matter of cultural and institutional settings in which they are positioned. The findings point to core issues in the evaluation of human communication, and the analysis of the complex relations surrounding academic publishing activities.

Assessment of productivity solely based on publication ignores almost all other processes of communication that take place before, during and after the publication. More importantly, it conflicts with the fact that discovery or insight often firstly happens in the laboratory, or even in an informal conversation among colleagues.

It is possible to identify two opposing attitudes that exists in scientific environments. According to their characteristics, behaviors, policies and technologies may be rated along a scale, with either extremes being "individualistic/egoistic" and "altruistic/collectivist".

The conclusion of the present work shows clearly that a "competitive / individualistic" characteristic / quality is the dominant ideological element. Furthermore, it demonstrates a certain set of attitudes, perceived here as the root of a contradiction.

Enhanced productivity in publishing is an effect of the need for points in an academic index. This explains the compulsory co-authorship between

professors (advisers) and doctoral students. However, the foremost ignored issue is the fact that productivity does not address properly quality. This leaves unanswered questions regarding the meaning of "performance" in academic environments.

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Atlanta's households' willingness to increase urban forests to mitigate climate change

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Keywords: *contingent valuation method; Tobit model, willingness to pay*

Introduction

Uncertainty remains about the full consequences of climate change, and the extent of distributional consequences of these changes are also unclear. It is apparent that individual groups within the American public may not respond to the issue of climate change in the same way. Engaging each group in climate change solutions will require different approaches. It is therefore important to understand how the public perceives climate change, their values and preferences, and barriers that might constrain their engagement to policy solutions.

Quantifying the effects of environmental policy alternatives is also important to further understand the public's values of a particular resource. Since environmental goods are not typically bought and sold in marketplace, the value estimates can be "revealed" by using stated information pertaining to the preference for the good (Carson, 2011). Some studies have estimated the monetary value of nonmarket benefits derived from urban forests. Lorenzo et al. (2000) estimated residents' willingness-to-pay (WTP) for community urban forests in Mandeville, Louisiana. Treiman and Gartner (2006) studied residents in Missouri communities and estimated their WTP for establishing a tree fund for community forests. These studies examined how much residents were willing to pay for urban forests as a whole and not for specific benefits that the urban forests may provide.

Material and Method

To gain a better understanding of whether Atlanta residents would support increasing urban forests as a climate change mitigation tool and if they would be willing to pay for such a policy; the amount of forest cover in Atlanta was estimated, a mail survey was implemented, and the responses to the survey were analyzed. Atlanta, Georgia, USA was selected for this study given its environmental issues such as the heat island effect and land cover changes, including conversion of forestland, that come with rapid population growth and urban sprawl.

The mail survey was written to assess respondents' attitudes towards climate change and the potential of urban forests to address climate change effects, how they received their climate change news, their willingness to pay for expanding urban forests as a method to address climate change mitigation, and demographic information. Respondents were selected randomly within the Atlanta city boundaries. A pre-notification card was sent two weeks before the survey was mailed and an additional follow up reminder was sent two weeks after the survey.

The survey instrument provided a scenario asking the respondent whether s/he would vote in favor of an increase in urban forests in Atlanta if the measure were included on the next ballot, using an open bidding process. Willingness-to-pay (WTP) was estimated to quantify the effects of the referendum by using a Tobit model, and a multivariate weighting strategy was used to address nonresponse issues.

The percentage of tree canopy for each respondent's corresponding Census tract was estimated by using the i-Tree Canopy[1] program. i-Tree Canopy is an open source tool that randomly lays points onto Google Earth imagery and the user can then classify the cover class for each point.

Results

The WTP analysis showed that Atlanta households are willing to pay $1.05 million to $1.22 million per year, or $5.24 to $6.11 million over a five-year period. Residents who reside in higher tree canopy areas may be more willing to pay more for urban forests because they more readily benefit from the trees. Contrary to previous studies, educational attainment did not have a significant relationship with WTP, but income was found to be significant, which was consistent with previous studies (Zhu and Zhang, 2008; Zhu and Zhang, 2006). Media preferences for climate change information played a role in predicting the attitudes and preferences of climate change mitigation.

Discussion

Results are relevant to practitioners and those who are interested in the value of the increase in urban

[1] i-Tree Canopy. I-Tree Software Suite v.5.x. (n.d.). Web.

forests as part of a climate change strategy. City officials who may want to increase urban forests, could implement a referendem to levy additional funds specifically targeted at urban forests. Cities could also work with well-respected local nonprofits to achieve similar objectives in responding to societys' urban forestry needs, especially if residents in the community lack faith in the city government. Quantifying the effects of such a referendum to better understand the public's valuation of urban forest resources is an important first step in examining the opportunities and consequences of increasing urban forests.

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Socio-economic Importance of Health-hygienic Forest Services Including Non-wood Forest Products in the Czech Republic

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Keywords: *non-wood forest products, forest frequentation, socio-economic importance, Czech Republic*

Introduction

Health-hygienic forest services reflect the fact that people use forest environment for recreational, relaxation and health purposes. Recreational functions of forests are of special importance for the rural development. The most frequently visited and attractive forests have been declared to be forests with priority recreational and therapeutic value (Forest Act No. 289/1995). The importance of public access to forests is being recognised as a public interest and is guaranteed by legislation. Free access to the forests, especially if it includes the opportunity to collect non-wood forest products (NWFP) – forest berries, mushrooms, medicinal plants free of charge is an important element in enhancing the recreational importance of forests. The area of forests from which the public is excluded does not exceed 10% (nature conservation, protection of water sources, hunting purposes, military interests and, marginally, private owners' interests).

The importance of forest areas for recreational purposes has been systematically investigated in the Czech Republic (CR) for a long time. Data obtained from sociological surveys of representative samples of population (Sisak, Pulkrab 2009) show that people visit forest environment frequently and NWFP collection takes the 2nd place amongst the main purposes of forest visits.

Non-wood forest products (NWFP), mainly edible mushrooms, forest berries, and medicinal plants, are of rather big socio-economic importance in the Czech Republic (CR). Generally, people living in the area of the contemporary Czech Republic have collected and used NWFP freely and free of charge since the medieval times. Access and entrance to forests in all kinds of ownership has been largely unrestricted, with only a few exceptions as to individual localities – mainly strongly protected nature reserves, and military areas (Forest Act No. 289/1995).

In spite the fact the collection of NWFP is a very popular and important public activity, there was no objective information about the importance of the products for the Czech society before a large-scale investigation into the socio-economic importance of forest frequentation by people and NWFP collection started in 1994. The year 1994 can be considered to be the starting point of this systematic research into NWFP collection and its importance in the total CR frame for the Czech people.

Material and Method

The surveys from 1994–2015 were performed in close collaboration with the institutes engaged in investigations of public opinion (Amasia, Institute of Public Opinion Research, Centre for Public Opinion Research and Stemmark). The sample size in these surveys ranges between 1,000 and 1,100 respondents, by means of face-to-face CAPI (computer assisted personal interviews) using a standardised questionnaire. Respondents are chosen by quota method. Samples are representative within the population of the CR according to: gender, age, education, region, size of respondent's residence. Data collection is checked against ESOMAR standards. The fieldwork of the inquirers is overseen by supervisors and 20% of the interviews are controlled.

During the period of 1994–2015, significant political, socio-economic, ownership and structural changes took place in the CR in forests and forestry. Nevertheless, the changes have not substantially influenced NWFP production and collection by forest visitors. Since 1994, the respective research projects have been supported by several institutions such as the Grant Agency of the CR, National Agency for Agricultural Research, the Ministry of Agriculture – Forestry Branch, and the Ministry of Education. Nevertheless, the structure of research projects in the period, the quantity and quality of data collected and processed, were influenced by the available funds. But the methodology, data collection, and forest frequentation analyses, were performed in all years by a single institution, the Department of Forestry Economics and Management (at present the Department of Forestry and Wood Economics) in the Faculty of Forestry and Wood Sciences, the Czech University of Life Sciences Prague with the main aims of identifying and analysing the long-term socio-economic importance of NWFP

collection and forest frequentation for the Czech people.

Results

The long-term trend of the overall collection of mushrooms and berries per household is more or less stable. The fluctuations in the collected quantities of NWFP by main items of NWFP in the period of 1994–2015 (the following Tab. 1) can be most likely explained both by the weather fluctuations (temperatures and precipitations regime in respective years and regions) including random disasters, and by socio-economic conditions as well (levels of unemployment, income and prices) in the particular years. NWFP collection influences to a great extent also the level and structure of forest frequentation. Total amounts of forest visits in period 1994–2015 vary between 13.5–25.7 per inhabitant and 56.9–109.3 per ha of forest – see Tab. 2.

Table 1: Amount of collected NTFP in CR (mil. CZK) in 1994–2015; (Source Sisak et al, 2016 – updated and completed).

Years	NTFP						
	Mushrooms	**Bilberries**	**Raspberries**	**Blackberries**	**Cowberries**	**Elderberries**	**Total**
1994	1,314	881	180	161	22	140	2,698
1995	1,658	1,164	248	169	43	137	3,419
1996	1,082	456	173	129	42	113	1,995
1997	1,510	585	202	96	72	95	2,560
1998	1,578	727	260	138	51	118	2,872
1999	1,880	973	197	144	105	149	3,448
2000	2,087	628	290	218	66	72	3,361
2001	2,298	710	294	176	65	93	3,636
2002	1,922	821	261	162	89	111	3,366
2003	1,399	562	218	170	36	80	2,465
2004	1,420	538	198	138	194	102	2,590
2005	2,048	670	246	125	85	101	3,275
2006	2,677	849	257	130	103	103	4,119
2007	3,415	967	245	185	78	139	5,029
2008	1,968	430	106	63	71	57	2,695
2009	2,056	725	99	91	64	111	3,146
2010	2,950	920	215	187	35	63	4,370
2011	4,313	921	208	234	142	177	5,995
2012	5,241	762	422	382	45	222	7,074
2013	5,388	1,484	329	182	69	209	7,661
2014	**4,295**	**848**	**252**	**179**	**83**	**195**	**5,851**
2015	**3,523**	**1,227**	**419**	**344**	**111**	**268**	**5,890**
Average	**2,546**	**811**	**242**	**173**	**76**	**130**	**3,976**
STD	**1,250**	**250**	**78**	**72**	**38**	**53**	**1,551**

Table 2: Forest frequentation in 1994–2015.

	Annual visits number			Annual visits number	
Years	**Per 1 inhabitant**	**Per ha 1 ha**	**Years**	**Per 1 inhabitant**	**Per ha 1 ha**
1994	25.3	105.7	2006	18.8	79.3
1995	22.4	93.4	2007	18.9	79.6
1996	17.3	72.0	2008	13.5	56.9
1997	23.4	97.4	2009	16.5	69.6
1998	19.4	80.7	2010	20.3	85.3
1999	21.6	89.9	2011	23.1	98.5
2000	22.6	94.1	2012	24.0	102.0
2001	23.1	96.3	2013	25.7	109.3
2002	19.6	81.5	2014	19.3	82.1
2003	19.3	80.4	2015	22.1	94.0
2004	16.2	68.0	**Average**	**20.6**	**86.5**
2005	20.4	85.9	STD	3.0	12.8

Majority of inhabitants visit forest environment. Only a little part of inhabitants does not visit forests per year (10–15%). The other part of population visit forests at least 1–2 times in a year and they represent almost all population able to visit forests. As for the main purpose of visits, a short-term relaxation takes the 1st place with 42.5% visits. The second place is occupied by the picking of non-wood forest products, which is the main purpose of 28.3% visits. Hobby reasons (hunting, sports and activities of different public groups of naturalists interested mainly in recognising and protection of nature) are the main purpose for 12.2% visits. Long-term recreation is the main purpose for 7.8% of visits.

Discussion – The socio-economic essence of NWFP in CR

The collection of NWFP, as a forest externality, has a double socio-economic meaning. On one hand, the products are part of physical production (tangible goods), but on the other hand, they can be ranked among intangible outputs as a part of the recreational function of forests (Gregory, 1972). The same can be said about the situation in CR. Many NWFP collected by forest visitors are a substitute for similar agricultural products. However only a fairly small part of the NWFP picked free of charge is marketed in the CR. The greater part is collected by forest visitors and consumed within their own households, influencing the market and substituting other similar products of an agricultural origin bought at market prices. The importance of NWFP collection as an externality could be expressed simultaneously both in the context of a non-market (recreational) forest service and in the context of a market or "shadow market" (production) forest service.

Material value of collected only mushrooms and 5 main species of berries in an average year is equivalent to more than 3,500 mil. CZK (56 EUR/ha of forest), i.e. 18% of the average annual sales of the intensive forestry timber production in CR. The value is further enhanced by collecting of commodities that have not yet been embraced in a reliable way into investigations, like medicinal and ornamental plants.

Theoretically, NWFP could be also produced commercially and then marketed by forest owners, tenants and businessmen, but this is an extremely rare case in the present CR conditions. Additionally, forest legislation explicitly does not apply to commercial cultivation of NWFP. Nevertheless, the NWFP can be still considered as a potentially important contribution to the economy and a significant market factor in rural areas. A large part of the NWFP (forest fruits, mushrooms, medicinal and ornamental plants) can be regarded as an alternative to agricultural production, and marketed as high quality organic products (even "bioproducts"). Forest management for timber production combined with the production of NWFP could be taken as a kind of "symbiosis" between forest management with classical objectives (timber, environment) and simultaneously for forest production of a more agricultural type. Essentially, it parallels production from tropical and subtropical zones which we refer to as "agroforestry", even though the conditions are those of the temperate zone.

This more holistic conception of multi-production forest management could increase the attraction, flexibility, socio-economic stability and sustainability of forestry and forest management in some rural regions of the CR. However, it would be necessary to prepare the society in CR for such a change, and to adjust forest policy and legislation.

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Time Series Analysis in Forest Sector Forecasting

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Keywords: *time series, forest sector, VAR, VECM, cointegration, nonstationarity, forecasting*

Introduction

Among the various functions of the forest its special significance as a source of raw materials for the timber industry can be emphasized. Wood is environmentally friendly and renewable resource. By the growing and simultaneously competing use demands on the natural product wood, its commercial role becomes increasingly important.

To bring economic potentials into conformity with social and environmental requirements for the performance of the ecosystem forest, a wise management of the use of the natural product wood is necessary. In this respect, an optimal institutional framework is fundamental for a successful, sustainable-oriented and bio-based economic policy, which not only Germany but the European Union as a whole has committed itself.

Therefore, reliable predictions about possible changes in the timber market play a key role in supporting decision making. Especially predictions about future developments of quantities and prices are crucial for the management in forest industry as well as for traditional forest management such as timber production. Forecasts help to recognize and minimize risks in the supply chain management e.g. initiating the adjustment of timber harvesting to changing market conditions.

For this purpose, the statistical technique of time series methods are presented and their importance in forest research is examined.

Time series analysis has been widely used in different fields of science for many years. Time series models are basically used to detect the underlying relationship between the observed (past) values of variables on the one hand. On the other hand, they help after fitting a model to predict the future values of the variable of interest. The main purpose of this research method is to extract important forecasting information out of the time series and to use this information to identify future economic developments.

The fact that time series methods provide strong results combined with only very modest data requirements underlines their unique usefulness for the analysis of forest economics problems. This accounts for the often very complex models which forest sector is confronted with.

Starting with the predominant class of ARIMA processes Box and Jenkins (1970) developed a first multivariate time series method, which accounted for the statistical character of the time series. Since then a lot of research has been done particularly concerning the properties of time series and related to this on the significance and consistency of research outcomes.

The most common class of multivariate time series is the class of vector autoregressive (VAR) models which were originally designed for stationary processes. Usually though, economic time series are of a dynamic nature. This is the reason why they are characterized by nonstationarity.

Engle and Granger (1987) have shown that when time series are characterized by nonstationarity, cointegration is a particularly appropriate statistical technique to cope with spurious regression resulting from nonstationarity. In the presence of a cointegration relationship between time series the use of a vector error correction model (VECM) appears to provide better results in terms of forecasting quality.

Material and Method

A thorough overview of the existing scientific literature in forest sector modelling in the field is presented as well as the attempt to develop a simple model which allows for meaningful predictions of export and import volumes and prices.

To do this, past values of export and import volumes and prices for the period from 1995 to 2012 of raw timber in Germany are the variables used in the model as well as the gross domestic product (GDP) and the exchange rate as economic indicators.

The advantage of vector models is used where there is no necessity for distinction between exogenous and endogenous variables.

Empirical Results

Estimations are generated for eight quarters, Q1:2013 to Q4:2014, with a confidence interval of 0.99. Qualitatively good forecasts are provided for export volume, export price and GDP. Predictions regarding the export volume of raw timber happen

to be also quantitatively well when considering only the first four quarters of the forecasting horizon.

Discussion

Time series allows for simple modelling providing firm results while at the same time using already available and free accessible data.

Using e.g. a VECM the possibility of meaningful predictions for export and import volumes and prices of raw timber in Germany is proved to succeed quite well for export quantity and prices.

Similar studies have been done for North America and the Scandinavian countries. Hetemäki et al. (2004) e.g. use the German lumber import demand to study the Finnish lumber export and, in turn, the impact on the Finnish sawlogs demand. They compare different models and come to the conclusion that the VECM suits the data best which stays in line with the results presented here.

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Non-timber innovations

An innovation system analysis for side-activities of forestry

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Keywords: *forestry, innovation systems, non-timber forest products, case study, Styria.*

Introduction

Non-timber forest products are often presented as a potentially promising but neglected business field of forest holdings. Thus they are often termed "side-products", "niche markets" (Mantau et al., 2001) or even "non-market goods (Mavsar et al., 2008). Much more often than of a business field, non-timber products and services are talked of as eco-system services and they are assumed as being provided in the "wake" of regular timber production.

In view of the broad range of market sectors that are concerned – including food and beverage, medicinal, pharmaceutical and chemical products as well as craft and decoration – a generalisation is, of course, very difficult. Except for a few products such as cork or mushrooms in some Mediterranean countries, it is certainly the typical case that forest holdings and forest innovation systems focus on the production of timber and do see other products as side-, by, or minor products (Mavsar et al., 2008; Weiss and Rametsteiner, 2005). As a result, the field of non-timber products and related business opportunities are hardly visible and recognized, although they seem to be bigger than often thought (Wolfslehner and Vacik, 2009).

The problems behind why the assumingly bigger potential is partly neglected include, first, a limited marketability, connected to the often found public good character of such products (Mantau et al., 2001; Mavsar et al., 2008) but, second, also a limited attention of established sectoral innovation systems, thus providing only limited support of or even barriers against their development (Rametsteiner et al., 2005; Weiss et al., 2011; Buttoud et al., 2011). This paper starts from the second observation and aims to analyse in an empirical example what this unfortunate environment means for innovations in the field of non-timber products. How do they come about? What support and what barriers exist?

Material and Method

This paper thus asks, how do innovations happen in a situation where there is very limited institutional innovation support. For doing this, it applies the innovation system approach and chooses the region of Styria (Austria) as an empirical example.

The material used includes the following: relevant organisations and policies that are important for supporting innovation processes in the field of non-timber forest products in the region of Styria. Questionnaires have been sent to and interviews have been conducted with central innovation system actors and with innovators in specific innovation case studies. Analysis questions include from which administrational levels the relevant support policies are and from which sectors, and what are the goals and measures applied. Besides of financial support mechanisms, the analysis specifically looks at research and development, education, training and information activities related to non-timber forest products. In addition, in-depth analyses of innovation processes in selected innovation examples from the region were conducted. These include the following products: game meet, Christmas trees, mountain pine essential oils, chestnuts, muchrooms, herbs and forest fruits. Some of the included cases are supported by policy programmes, marketing organisations and/or labels, for example, the LEADER+ programme, Nature Park Specialities, the Styrian Christmas tree association, Urlaub am Bauernhof (farm holidays) and Genussregion Österreich (Gourmet region Austria).

The material and analyses have been conducted as part of the European research project StarTree, and between 2014 und 2016.

Results

Characteristics of non-timber forest products in Styria – For a better understanding of innovation conditions in Styria, we provide an overview of current and future potential uses of non-timber products. They are mostly related to the food and beverage sector, but are poorly developed. Exemptions may be seen in Swiss stone pine or rowan and service tree products for which small markets exist (e.g. liquor or jam). Only game meat and honey markets are well developed. We see a certain future potential for game, honey, mushrooms, edible nuts and fruits (e.g for chestnut). Environmental and recreational services that are directly or indirectly related to non-timber products are quite well developed in Styria, for

example forest pedagogics. Tourism services such as guided tours or farm holidays are also well developed, and are sometimes related to forest products or activities, e.g to wild herbs, berry or mushroom picking. It is expected that all of these activities that connect to new urban societal needs and values have high potential in the future. The central challenge in these cases is to bring together rural and urban spheres and thinking.

Innovation policies and actors – In Austria, innovations in non-timber sectors generally have often been developed without support by specific policy fields or, in other words, "between" established innovation systems (Kubeczko et al., 2006). Non-timber forest products are neither in the focus of national or regional innovation policies nor of forest sectoral policies. Relevant policy measures that may be utilised are related to regional or rural development programmes. Their aims are to develop new (sustainable) products and markets in order to stop emigration from rural areas, increase attractiveness of the regions, secure jobs and to enhance cooperation within the rural population through networking to support knowledge transfer. The EU LEADER programme is well suited because of its innovation orientation and because of its bottom-up working method. Although the LEADER instrument has not been strongly used within forestry throughout Europe and Austria (Feliciano et al., 2011), there are two **LEADER regions** in Styria, **"Zirbenland - Land of the Stone Pine"** and **"Holzwelt Murau - Wood World Murau"**, which specifically focus on forest and trees. While Wood World Murau aims to foster the use of wood, Zirbenland fosters cooperation and development around both wood and non-wood products from the local characteristic tree "Zirbe" (Swiss stone pine, Pinus cembra). The region of Zirbenland is innovative in terms of wood and related products and gains profile through regional marketing, awareness raising and networking activities. They have developed new forms of use of Swiss stone pine products in the food and non-food sectors, for instance, promoting health and wellness effects of the wood, needles and cones of this specific wood species.

The **Styrian Nature Parks** are active in developing forest products such as liquors, jam and herbal products. Their aims are to preserve characteristic cultural landscape types through a sustainable use of local resources and to strengthen the local and regional economy by integrated land management and adding new values to traditional land uses. They promote local specialities by their label "Naturpark-Spezialitäten" and offer educational services with local products embedded, e.g. guided tours, educational trails or "cooking from the meadow".

A few agricultural associations are relevant, such as the **direct marketing association on farm specialities** ("Gutes vom Bauernhof") and the **Austrian farm holidays association** "Urlaub am Bauernhof". These specific associations under the umbrella of the Chamber of Agriculture offer important services such as joint marketing and information exchange. The only forestry-specific is the **Styrian association of Christmas tree producers** which offers support and advice, joint acquisition as well as a label for the marketing of Styrian Christmas trees ("Steirischer Christbaum").

"Gourmet regions" is a direct marketing instrument, initiated by the Federal Agricultural Ministry and implemented in cooperation with the Chambers of Agriculture, which emphasizes the importance of regional specialties and thus contributes to attractive and future-oriented regions. One of the 17 gourmet regions in Styria is related to a forest product: **"Xeis Edelwild"** is producing high quality game meat. It is located in the **National Park area Gesäuse** and combines tourism and marketing of local products.

Discussion

Bottom-up innovations – As a result, it can be said that there is no "one" innovation system supporting non-timber products but support is given through certain programmes from several sectoral innovation systems, including forestry (Christmas trees), agriculture (LEADER, Urlaub am Bauernhof, chestnuts and the Gourmet region) and nature conservation (Nature Park Specialities). For none of them, "non-timber forest products" are a central or significant field of activity as such which implies that no specific knowledge, instruments or promotion activities are developed and that it is not easy for interested innovators to receive support. This is only achieved, once they reach a certain institutionalisation such as with the Christmas tree association or the LEADER region "Zirbenland" which as a whole took the Zirbe (Swiss Mountain Pine) as a trademark symbol. Non-timber innovations are typically generated from bottom-up in small, regional and often cross-sectoral "ad-hoc" networks (Kubeczko et al., 2006). The Styrian examples show that despite of the lack of specific sectoral innovation systems, the institutional system still has certain structures that are able to offer support – if they are open and flexible enough to pick-up emerging demands from practice. They also show that for establishing new products beyond single firms, the innovators often have to institutionalise themselves through which

the innovations gain an institutional dimension (Ludvig et al., forthcoming).

Need for flexibility in regional level support – When actors and support organisations are grouped according to types of organisations, most actors in Styria belong to interest groups, innovation support organisations and to research, education and training organisations. They are mostly regional level organisations. This observation goes along with the fact that the products are often of specific regional relevance. An important policy implication thus is that sectoral support programmes should provide for sufficient leeway to flexibly adapt to local products or other local specific needs.

Institutional barriers – Besides of these supporting policies, it is difficult to determine institutional barriers because they are not so visible. An indirect barrier is found in the fact that non-timber forest products are a side-activity of any relevant sectors which leads to a "blindness" of the institutional system towards these products: a lack of statistics, specific research, education and training programmes and focussed support structures are the result. The Styrian wood cluster organisation, for instance, does not include those products in their activities. The cross-sectoral characteristics of many of these products seem to be furthermore the reason for direct barriers because of a competition between the involved sectors – forestry, agriculture and nature conservation (Buttoud et al., 2011). The forestry sector seems to be hesitant in supporting activities which may benefit other groups than the land owners – these products are often for the benefit of processing companies, conservationists or the broad public.

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Governing payments for ecosystem services: What can be learned from comparing Chinese and American experiences of restoring degraded cropland?

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Keywords: *Payment for Ecosystem Services, policy design and implementation, ecological restoration, conservation reserve, program effectiveness and efficiency*

Introduction

Despite the consensus that payments for ecosystem services (PES) represent a novel, incentive-based approach to providing ecosystem services more sustainably, there remains a dearth of concrete and practical analyses of how to properly govern them. Further, while project-level issues like conditionality and additionality have received wide attention, it seems more relevant and appropriate to consider PES governance at the program level. A program, made up of multiple, specific projects with clearly defined targets and means and mechanisms to achieve them, tends to be more complex in content, larger in space, longer in time, greater in investment, and thus more closely linked to external settings and institutions.

As the biggest PES program in the developing world, China's Sloping Land Conversion Program (SLCP) has been in place for well over a decade—sufficiently long for its impacts, as well as its challenges, to be manifest and identified. In this paper, we examine the crucial aspects of governing the complex processes of interactions and outcomes involved in the SLCP by comparing it to the U.S. Conservation Reserve Program (CRP), which is the largest PES program in the developed world. Emerging from this analysis will be some important insights regarding how to more effectively, efficiently, and equitably govern SLCP and other PES programs in China and elsewhere.

Research Method

We adopt both qualitative and quantitative analyses in comparing and contrasting the experiences of retiring and restoring degraded cropland in the U.S. and China. We will draw information from Stubbs (2014) for the American experience and from Yin et al. (2014) for the Chinese experience. Moreover, we will examine the SLCP performance and challenges by taking advantage of a large panel dataset available to the author. The dataset, covering over 1,000 households for the period of 1999-2008, was built from repetitive surveys in six counties—Nanbu, Nanjiang, Mabian, and Muchuan in Sichuan, and Zhen'an and Yanchang in Shaanxi based on a stratified random sampling strategy. Moreover, to make our comparative study not only appropriate but also adequate, our analysis will incorporate the analytical problems of the well-accepted framing of earth system governance (ESG)—architecture, agents, adaptation, access, and accountability.

American Experience

Land retirement has been a mainstay of U.S. agri-environmental policy. According to Claassen et al. (2008), ever since the 1930s, the U.S. has relied primarily on voluntary payment programs to encourage soil conservation and other improvements in agri-environmental performance, although cross-compliance and regulation have also been used. The CRP is the largest federal, private-land retirement program in the U.S., which provides financial compensation for an extended period (typically 10-15 years) for the benefit of soil and water quality improvement and wildlife habitat. The program, first authorized in the Food Security Act of 1985, is administered by the Farm Service Agency (FSA) of the U.S. Department of Agriculture (USDA), with technical support from the Natural Resources Conservation Service and other USDA agencies.

Issues covered here include: How does the CRP work? How is the EBI formulated? How has the enrollment progressed? How about the CRP benefits?

Chinese experience

Following a piloting phase of only two years, the Chinese government launched the SLCP in 2001, under which farmers are subsidized at high, uniform rates for restoring degraded cropland Indeed, the SLCP is one of several large ecological restoration programs (ERPs) that the Chinese government initiated in the late 1990s in response to a series of environmental disasters, including flooding in the upper Yantze River basin in the southwest and Songhua River basin in the northeast, and soil erosion and land sliding across the west. Also, most of those regions of heavily degraded ecosystems in China happened to have a

high concentration of slower economic development and poverty incidence. The ERPs have thus been aimed at both environmental improvement and poverty alleviation.

Issues addressed here include: How has the program evolved? How are the subsidies compared to opportunity costs? How about income inequality induced by the program participation? How about the likelihood of reconversion?

Challenges facing the SLCP

Despite the remarkable achievements, there are major challenges facing the SLCP. For example, little was known of how to properly incentivize the local people to pursue the basic tasks, for how long and in what way(s) the subsidies should be provided, whether and how restoration practices should be differentiated, and how to combine incentive-based instruments with the regulatory and administrative means to carry out the targeted activities. These and other issues illustrate that even though it was ambitious and admirable to launch such a large PES program, it was not well designed and the government and society were not adequately prepared to implement it effectively.

Here, we elaborate on a few of the issues, including: Is the program efficient? How can restoration contracts be structured? How about decoupling conservation goals with poverty reduction?

Discussion

Elucidating the complex issues involved in PES design and implementation and searching for practical solutions to PES governance has become as an important international research topic. By comparing China's SLCP to the U.S. CRP, our analysis has yielded a number of valuable insights for China and other countries who have launched PES programs or are contemplating to do so.

We have made it clear that carrying out PES, especially large programs, entail long-term interactions of various components of the underlying social-ecological systems and lead to multiple, often mixed, and uncertain outcomes; and these ecological restoration and resource management programs are intricate and challenging undertakings. Rather than narrowly characterizing them as voluntary, conditional transactions, it is more beneficial to view them in terms of their provision of multiple environmental public goods on extensive spatial and temporal scales and involving a diverse number of consumers and producers. This broader and more practical perspective has enabled us to discuss the governance specifics and thus proposed more constructive means and mechanisms for more effective execution of PES in general and the SLCP in particular.

As a massive, nationwide program, the SLCP differs from some local PES schemes in China and elsewhere in several important ways. First, the SLCP was intended to deliver multiple ES, whereas local, small schemes often target one or two specific ES. Second, the SLCP also aims to reduce poverty and improve livelihoods, but many local schemes may not have to consider similar social objectives. Further, many local schemes may be able to tie payments directly to the particular service(s) delivered or promised, while the farmers participating in the SLCP are paid for changes to their land-use practices. Delineating and coordinating these practices for millions of smallholders is absolutely critical, which implies that individual participation may not be completely voluntary and that it seems flawed to characterize the implementation of such a large program simply as market-based transactions. In part, this is because of the short time for farmers to learn the restoration practices and respond to the announced policies, and the great tasks to be carried out by government agencies and local communities. Obviously, partnerships between individual farmers, community organizations, and local government agencies must be formed to enhance the likelihood of successful implementation of the program and the realization of the ultimate goals of restoration.

Also, there is a significant lag between the time when payments are made and the time when ES are provided. This indicates not only the difficulty to tie the payments and the expected ES directly but also the need to associate payments with certain preferred practices of land use, leading to improved generation of the desired ES. On the one hand, the critical relevance of monitoring the implementation effectiveness and the maintenance of consistency and persistency in the process calls for better conceived and more stable policy measures over time. In addition, because the beneficiaries of the ES are widely dispersed, it is hard to identify them and then impose any charge on them for compensating the ES providers. In reality, even the regional and local governments in China have largely shied away from assuming a substantive share of the financing responsibility; rather, the central government has had to appropriate most of the funds to carry out the program. So, the conditionality attached to payments is not only indirect but also low, and, as mentioned, the sanction for those who default their

promised responsibilities has generally been to suspend their payments, further calling the implementation effectiveness into question.

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Tools for Evaluating Sustainable and Multi-objective Forest Management Decisions

Exploring and Prioritizing Ecosystem Factors

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Keywords: *decision support systems, multifunctional forest management, participatory process, ecosystem factors*

Introduction

Correspondingly to Theme 4 of IUFRO strategy 2015-2019 (IUFRO, 2015): *"Forests provide a wide range of forest products and ecosystem services that are vital to humanity; developing effective decisions for the protection of biodiversity and associated ES requires a collaborative interdisciplinary research"*, we can state that forest management (FM) with its strategic, tactical and operational undertakings presents a very complex problem with strong multi-functionality. The management strategies must ensure both the owner's income and the other functions relevant to the public as a whole. Prior approaches to FM decisions that were for decades determined/chosen foremost with regard only to economic attitudes and within exclusive demand of one or a few individuals, must now be made with substantial public input (participatory process) while achieving economic, ecological and social objectives. In order to pursue these intents, the feasible FM decisions and objectives must first be generated, then evaluated and optimized according to the relative importance of each forest function.

Various tools, methods and decision support models (DSM) have been used in FM planning to determine the optimal decision. Here we briefly mention only a few of them which are often described in forest literature (Kangas et al., 2008, Sverdrup and Stjernquist, 2013). DSM in forestry can be classified according to the considered unit or level, quantitative and qualitative methods, deterministic, stochastic and heuristic algorithms, linear, non-linear, dynamic, multi-criteria, fuzzy, iterative, interactive, discrete and continuous approaches. For each DSM we can discuss its advantages and disadvantages for the use in FM. Earlier works in the field of forestry stressed the application of linear programming models, such as FORPLAN, to FM problems (Kent at al., 1985, Liu et al., 2006). The advantage of FORPLAN is that the relationships between objective variables (indicators) are linear and that the effects of different objective variables on the objective function is additive. One commonly stated shortcoming of FORPLAN is that it is a deterministic model. Stochastic DSM examines how the forest manager should understand model outputs in view of uncertainties (Kao, 1982, Kouba 2002, Eyvidson and Kangas, 2014). Nonlinear methods, such as discrete-time and discrete-state version of dynamic programming were also applied to the optimal FM problems (Zadnik Stirn, 2006). The multi-use forest management was expressed by goal programming (Diaz-Balteiro et al., 2013, Aldea et al., 2014, Limaei et al, 2014). Indicators and public values for sustainable FM were studied by Martin et al., (1996) using social choice methodology. Further, participatory processes and multi-functionality were incorporated in FM decision making by Nordstroem et al. (2010) and Grošelj and Zadnik Stirn (2013). Methodology implemented to collaborative FM focused on ecosystem factors (ESF) was proposed by Zadnik Stirn and Grošelj (2013) using group AHP (Analytic Hierarchy Process) combined with SWOT (Strengths, Weaknesses, Opportunities and Threats), and Segura et al. (2015) exploiting AHP and PROMETHEE (Preference Ranking Organization Methods for Enrichment Evaluation) methods. Various heuristic methods have been increasingly used in FM, as an alternative to mentioned optimization methods (Bettinger et al., 2002, Pukkala and Kurttila, 2005). The advantage of heuristics is their flexibility, the objective variables can be spatial and non-spatial, relationships between objective variables can be linear or nonlinear, additive, multiplicative or combination of both. The problem of heuristic methods is that they do not necessary find the optimal solution.

Consequently, to capture a group of decision makers (owners, experts, stakeholders representing interest groups, citizens, …) within DSM which is challenged with a long term, dynamic, multi-objective, ill-defined FM problem, we have merged the strengths of several methods to overcome their individual disadvantages. We present the DSM in which the decisions are determined by the use of qualitative methods, as snowball method, to include relevant participants, root-cause analysis tools, as CATWOE (Customers, Actors, Transformation, Worldwide, Owners, Environment) and DELPHI, brainstorming, for generating decision driven problem, i.e., to determine the decisions on survey basis, and

multivariate statistical methods to analyze the questionnaires. The objectives of FM are defined using different classifications of ESF and FM regimes dependent on management goals, current forest situation and preferences of decision makers involved. Finally, the objectives are evaluated and prioritized by group AHP and dynamic programming (DP). The proposed DSM is illustrated using a case study focused on the natural park network in Slovenia.

Material and Method

In the DSM the decision process is defined in terms of time periods, states, decisions and weighted values of criteria. Decisions and values of criteria are determined in a participatory process. As such, the presented DSM employs group AHP to evaluate objective functions of several decision makers. Finally, because FM is necessarily an ongoing process, the model is placed within a recursive decision framework of Bellman's type. The idea for the first period (similarly all the following periods are performed) is presented in Figure 1.

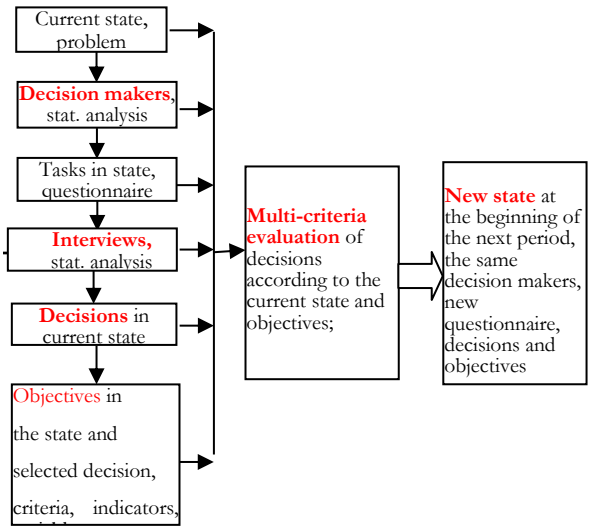

Figure 1: The DSM for optimal FM in first period

To illustrate the problem and developed DSM some computational experiences are presented where we deal with management of a forest area which lies in the north-west part of Slovenia. The area is important for the owners, experts, scientists and general public. The treated decisions are competitive and only one of them could be selected in one time period. For the sake of simplicity, we took into account maximal three decisions at each stage.

Results

The presented DSM was implemented in a forest in the north-west of Slovenia. The forest of 384 ha is under Natura 2000 and is state owned. The variety of species is great (102 tree species, 33 bird species, etc.). The main tree species are oak, pine and beech. The area is of educational and research importance, includes forest trails, recreational areas and offers employment to several professionals from the vicinity. Nine decision makers were selected to generate feasible scenarios for sustainable, multi-functional, long term FM of the selected forest regarding economic, social, ecological and educational demands of the owners, experts and public. Three scenarios were considered. They were assigned as (i) d_1, which may be interpreted as economically oriented because it sustains the economic development of the forest, (ii) d_2 is ecologically oriented because it maintains the environmental sustainability of the forest, above all the biodiversity, and (iii) d_3 which is educationally oriented as it supports the issues developed with an aim to educate the visitors about the forest in many ways. The decisions are evaluated by indicators representing ESF. Through meetings and interviews with decision makers several indicators were taken into account and statistically analyzed. After factor analysis 13 main indicators were determined, as shown in Figure 2. These indicators support economic, ecological, social and educational criteria/objectives. The importance for each indicator, each criteria and each decision was determined through group AHP method (more details in Zadnik Stirn and Grošelj, 2013) by nine selected decision makers.

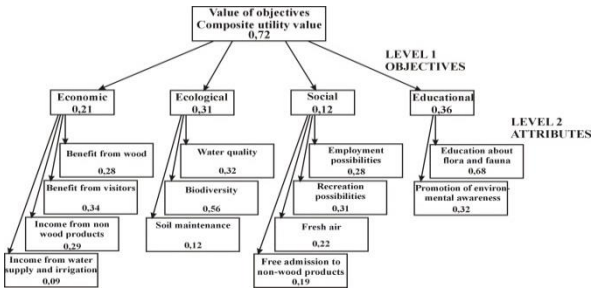

Figure 2: Objectives and attributes (indicators) for economic oriented decision (d_1)

Results of discrete deterministic dynamic procedure revealed for the treated forest, with three time periods, is presented in Figure 3. The optimal sequence of decisions is established recursively by Bellman's principle of optimality. The results show that the optimal sequence of decisions over three time periods consists of d_2 (the ecologically oriented decision) in the first time period, again d_2 in the second, and d_3 (educationally oriented decision) in the third time period.

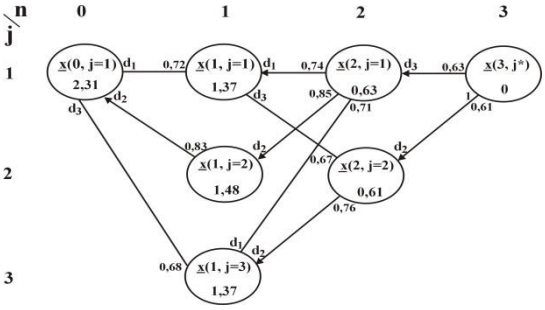

Figure 3: Network for dynamic procedure with three periods

Discussion

The aim of this paper was twofold. Firstly, to summarize the DSM for FM that should be valid in areas where forests are continuously used for production, where biodiversity aspects are important as well as economy and productivity, and where demands on soil status, water quality, recreations and other ESF are demanded by a large group of decision makers who benefit from several amenity values of forest. Secondly, to present DSM which identifies the current state of the managed forest, including ESF, all crucial decision makers in FM process, develops feasible scenarios and finally evaluates criteria (indicators) in order to determine the optimal FM scenario. Especially long-term aspect is emphasized, and it is shown how system model thinking is used to reach the goals.

Provided information helps by establishing payment systems for environmental services. Further, this approach overcomes the difficulties found in prioritizing (ranking) management objectives in multiple criteria context and facilitates consensus between all the people involved, because decision makers, technical staff and other stakeholders are included in the process from the beginning by identifying scenarios, indicators, criteria, objectives and eliciting preferences. Then, qualitative and quantitative data are integrated into a group AHP in order to provide the long term credible solutions which facilitate the acceptance and implementation of the FM decisions in accordance with all potential forest users.

During the implementation of the DSM, preferences of the decision makers may change, or new ideas of the experts can be produced. In order to control such changes the system must be constantly monitored to ensure that the chosen parameters are still relevant. As soon as they change, the feedback in the DSM should be observed.

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Approaches to evaluation of benefits from the conversion of even-aged secondary spruce stands in the Ukrainian Carpathians into mixed, uneven-aged woodlands

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Keywords: *forest ecosystem services, ecosystem service cascade model, DPSIR model, economic analysis.*

Introduction

Multifaceted challenges of climate change put at threat a time-proved forest management. More holistic framework instead of a narrow commercial vision has to be developed to more effectively and efficiently manage forests in new and more turbulent conditions. Productivity loss and the need to ensure ecological resilience in the Ukrainian Carpathians root in transformations that occurred in the region during the Austro-Hungarian period, when 178 thous. ha of native beech, Fagus sylvatica, and mixed coniferous-broadleav ved forests were converted, for economic reasons, to Norway spruce, Picea abies, which was native to the region, but too intensively planted on non-endemic sites, using non-local genetic varieties (Keeton and Crow, 2009). Nowadays, under climate change conditions such forest ecosystems start losing vitality (Krynytskyy and Chernyavskyy, 2014).

More recent exhaustive timber harvesting (1956-1960), when annual harvested volume exceeded average increment almost twice (Gensiruk, 2002), resulted in current strong disproportion in forest age structure, drastic shrink of biological and landscape diversity and a disturbed hydrological regime in the Carpathians. These factors have undermined the welfare of local communities and prosperity of the region (Krynytskyy et al., 2014; Soloviy, 2010). Gradual conversion of even-aged pure secondary plantations into mixed, uneven-aged stands is thought as an effective way to tackle these problems (Soloviy et al., 2011; Lavnyy and Schnitzler, 2014; Chernyavskyy et al., 2015).

According to experts' estimations the conversion process induces a broad range of benefits, namely:

- Higher resilience and resistance of forest ecosystems to natural and anthropogenic disturbances and better adaptation to climate change (Parpan et al., 2014; Soloviy et al., 2011);
- Increase of biomass productivity of forest ecosystems: in mixed stands of European spruce and European beech, the productivity increases on average by 20% in comparison with pure stands of the same species (Pretzsch et al., 2014);
- Reduced risk of landslides;
- Reduced risk of pathogen impacts (Parpan et al., 2014);
- Decreased financial risks due to forest species diversification (Hildebrandt and Knoke, 2009);
- Improved hydrological regime, and increased water supply (Kulchytskyy-Zhyhaylo and Kulchytska-Zhyhaylo, 2011);
- Enhanced biodiversity (Krynytskyy et al., 2014; Carnus et al., 2006);
- Increased recreational value of mixed forest landscapes and of the value of real estates (Grilli et al., 2014).

However, the main difficulty associated with an evaluation of benefits of the conversion process is the nature of these benefits. In recent discourses of economic analyses of forest projects, the ecosystem services concept (MEA, 2005; TEEB, 2008) is widely thought as the most relevant instrument for identification of benefits associated with a conversion project. However, implicit nature of a significant part of forest ecosystem services (FES), non-rival and non-excludable from the ecological economics perspective (Daly and Farley, 2011), causes market failures, resulting in the incapacity of markets to signal their scarcity and to provide market incentives to regulate their supply (Nijnik and Miller, 2014). This also makes it impossible to measure part of the FES value by means of traditional economic methods.

Moreover, Nijnik and Pajot (2014) showed that the choice of discounting had considerable influence on decision-making concerning woodland development, undermining the traditional CBA framework. It was also demonstrated by Munoz-Rojas et al. (2015) that choosing 'right' species and locations for tree planting is crucial as well as using of evidence from economics to help place forestry in the general context of multifunctional land use. Nijnik et al (2012), for example, considered the case of tree-planting for timber production, erosion prevention, and climate mitigation in Ukraine, including in the Carpathian Mountains, and to analyse the costs and benefits of this project they

combined econometric analysis, simulation modelling, and linear programming. Innovative suggestions to integrate analytical and participatory techniques with visualization tools have also been put forward (Nijnik et al, 2013). It was demonstrated that proper integration of several social science techniques can work well (Nijnik et al., 2008), and based on the "people included" principle these proved to be helpful in uncovering ecosystem services related values connected with human perceptions (Nijnik and Miller, 2014).

Taking this into consideration, the purpose of this paper is to review and advance existing approaches to evaluation of benefits of even-aged secondary spruce stands' conversion into uneven mixed stands in the Ukrainian Carpathians by suggesting a proper integration of several research techniques. In this context we consider three approaches and five steps of the analysis (explained in the following section): (1) expert perceptions of FES provided by mixed forest stands as these are compared to pure secondary spruce stands; (2) holistic analysis of the conversion problem for even-aged secondary spruce stands using the DPSIR approach; and (3) economic analysis of benefits of the conversion project in a Ukrainian Carpathians.

Material and Method

Evaluation of benefits from the conversion of even-aged secondary spruce stands in the Ukrainian Carpathians was carried out in five steps.

Step 1. We conducted an extensive analysis of peer-reviewed literature and the most influential studies relevant to identification of the essence of ecosystem services (MEA, 2005; TEEB, 2010; CICES, 2013; Costanza, 2008; Fisher et al., 2009). Understanding of ecosystem services as ecosystems' contribution to human's well-being provided us with a proper framework for identification and evaluation of the conversion benefits. Also we analysed current economic approaches, elaborated by the international schools of environmental economics.

Step 2. The ecosystem service cascade model (Potschin and Haines-Young, 2011; CICES, 2013), advanced by as further, provided a comprehensive framework for identification of the links between ecological and social systems. It revealed how biophysical structures and processes cascade through both these systems and transform into ecosystem services through the ecosystem functions.

Step 3. A comparative analysis of expert views on FES provided by pure vs. mixed forest stands was conducted using questionnaire method.

Step 4. We applied the DPSIR methodology (EEA, 2007; Carr et al., 2007; Kagalou et al., 2012) to reveal, understand and visualise the causal relationships between society and mountain forest ecosystems and adopted the DPSIR model to the conversion of even-aged secondary spruce stands in the Ukrainian Carpathians, as a case study. This model facilitates sustainability-based stakeholders' networking and, the building of common grounds and of cooperation.

Step 5. To conduct an economic analysis of the conversion projects we centred on the following approaches: cost-benefit analysis (CBA), especially its extended version, cost-effectiveness analysis (CEA) and environmental impact assessment (EIA). The first two techniques were elaborated and applied in this paper.

To estimate a monetary value of benefits which arise in the process of pure stands' conversion into mixed un-even-aged stands, we applied CBA (FAO, 1992; Hanly and Spash, 1993; Cubbage et al., 2013), a procedure that allows to systematically compare costs and benefits that society associates with project implementation. This technique enables to consider positive and negative externalities of the conversion process, revealed through the previous steps.

Results

Step 1. Conceptualisation and classification of ecosystem services originated by Costanza (1997), Daily (1997) and de Groot (2002). These ideas were later on popularised in the MA (2003-2005) and TEEB (2008; 2010) reports, further reassessed by Boyd and Banzhaf (2007), Costanza (2008), Fisher and Turner (2008), Haines-Young and Potschin (2009), CICES (2013) and others. The value of multiple FES was conceptualised and valuation methods analysed at appropriate scales, and knowledge of non-market valuation has been extended (Nijnik and Miller, 2014). This knowledge provided a background for operationalising of FES.

In the research we applied the CICES definition of ecosystem services as a contribution that ecosystems make to human well-being, i.e. outputs that directly affect the human well-being (CICES, 2013). A consideration that FES is the contribution of ecosystems to human well-being (CICES, 2013), in contrary to the vision that ecosystem services are benefits (MEA, 2005), allowed us to maintain their links with ecosystem functions, processes and structures. Application of the CICES classification made results across different studies comparable. Therefore, we applied it in our case study.

Step 2. To investigate an interdependence between the social and ecological systems from the FES perspective we proposed to complement the ecosystem service cascade model (Haines-Young and Potschin, 2009) with a backward link in order to explain how ecosystem services, their prices and stakeholders' knowledge, perceptions, values and the corresponding prices underpin forest decision-making and shape institutions, which foreshadow the ecosystems' structure and quality. Such an extended cascade model for the conversion project revealed synergies and conflicts which arise at all levels of the ecosystem services use, management and governance. Institutions and governance structures are considered to be shaped by these values and generate relevant policy and instruments to change anthropogenic impacts on forest ecosystems and on their biophysical structures and functions.

Step 3. To understand stakeholders' preferences concerning FES produced by pure vs. mixed forest stands we run the survey and approached two groups of stakeholders: Scientists and Forest enterprise employees. We conducted 20 interviews that lasted from 15 to 25 min. each. Our questionnaire contained three subsections: the first section included questions about professional characteristics of respondents; the second section was dedicated to respondents' identification of the importance of FES; and the third section dealt with a comparative evaluation of a quality of FES provided by pure secondary vs. mixed stands. To scale the values of FES quality we proposed our respondents to use a 5-point Likert scale.

The results demonstrated (with a probability of 99%) that respondents value FES of mixed stands higher than FES of the pure stands. This difference is the most significant for all such CICES v.4 (2013) divisions, as Materials (Provisioning section) and whole Regulation & Maintenance section. This difference should be considered in the economic assessment.

Step 4. The DPSIR model developed to analyse existing interactions between the social and ecological systems, namely mountain forest ecosystems, revealed a range of natural, social-economic and institutional drivers on the present state of these, coupled systems, the arising pressures on ecosystems, and the current state, impacts, and responses. Among natural drivers we observed climate change and a complex nature of social and ecological systems. Concerning the social-economic drivers, we observed underestimation of the vital role that ecosystems play in human well-being and in land use. Discrepancy and lack of coherence in stakeholders' activity, as well as financial shortage explained the institutional drivers in the DPSIR model. The model allowed us to examine how changes in forest practices, including the conversion processes, affect the state of ecosystems and of the ecosystem services flows they produce.

Step 5. Furthermore, findings from this research demonstrated a positive net present value for financial and economic components of the conversion of even-aged secondary spruce stands. However, sensitivity analysis revealed a strong dependence on non-market values, such as social cost of carbon sequestration.

Discussion and Conclusion

A major drawback of the CBA method is that it takes into account only those costs and benefits, which have monetary values. Therefore, it is not easy and not always pertinent to apply it for projects that have a significant impact on the environment and on the welfare of society. To economically assess a conversion project it is also possible to apply CEA. This method avoids the assessment of benefits and focuses instead on the analysis of expenditures, which are generally easier to track and evaluate. Moreover, when intrinsic values of nature (public goods e.g.) are concerned, it is likely more appropriate to apply environmental impact assessment (EIA), which comprises a systematic identification and assessment of potential impacts of projects, programs or legislations, and which considers physical, chemical, cultural and socio-economic components of the environment. However, a novel approach suggested in this paper is a combination/integration of several techniques.

Findings from this research provided indication that conversion of even-aged secondary spruce stands in the Ukrainian Carpathians into mixed, uneven-aged woodlands is likely a timely, beneficial and complex process. Benefits of the conversion are numerous and multifaceted. Mainly they strengthen each other and create synergies (Krynytskyy and Chernyavskyy, 2014). However, the efficiency of conversion depends on a variety of factors, and first of all on the expertise of decision-makers who design the conversion procedure and on availability of investment.

We believe that approaches elaborated in this paper and their integration, are helpful in evaluation of the effectiveness and efficiency of a conversion project. Various evaluation techniques have their different aims, data requirements and instruments and serve different purposes. Some of them can complement each other and needed to validate

results and to overcome the dominance of economic criteria in evaluation of forest related decision-making (when implicit values and public goods of forest are a matter of concern). The sensitivity analysis brought additional insights into an economic perspective of CBA, but further considerations of non-market values are yet needed.

To conclude, the demonstrated methods are useful, but none of them is universal, and their proper integration, as suggested in this paper, adds up. Also, despite a large number of methods that can be used to determine an economic value of benefits from the conversion of even-aged secondary spruce stands in the Ukrainian Carpathians into mixed, uneven-aged woodlands, the issue of efficiency and effectiveness of the conversion process is case and context specific, and merits further attention.

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