

# IUFRO 3.08.00 Small-scale Forestry Conference 2023

## Small-scale Forestry and Modern Society

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Cover Photo: Meelis Teder (1, 4) and Allar Padari (2, 3)

Eesti Maaülikool 2023

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# Committees

## Scientific committee

Henn Korjus, PhD, Estonian University of Life Sciences, Estonia

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Ahto Kangur, Professor, Estonian University of Life Sciences, Estonia

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Marek Irdla, Estonian University of Life Sciences, Estonia

Gerly Kroll, Estonian University of Life Sciences, Estonia

Allar Padari, Chief specialist, Estonian University of Life Sciences, Estonia

The conference is organized by the Institute of Forestry and Engineering at University of Life Sciences, Estonia in conjunction with the IUFRO research group 3.08 Small-scale forestry.

## SCHEDULE

Date	Time	Event
22.08.2023	9:00 - 10:40	Plenary session, room: 1A5
	10:40 - 11:10	Coffee break
	11:10 - 12:40	Parallel sessions, room: 1A5 and 1B2
	12:40 - 13:40	Lunch time
	13:40 - 15:10	Parallel sessions, room: 1A5 and 1B2
	15:10 - 18:00	Small excursion in laboratories, Ice breaker
23.08.2023	9:00 - 10:30	Parallel sessions, room: 1A5 and 1B2
	10:30 - 11:00	Coffee break
	11:00 - 12:00	Parallel sessions, room: 1A5 and 1B2
	12:00 - 12:20	Poster session
	12:20 - 13:20	Lunch time
	13:20 - 14:50	Parallel sessions, room: 1A5 and 1B2
	14:50 - 15:20	Coffee break
	15:20 - 17:20	Presentation session, room 1A5
19:00 - ...	Conference dinner, Püssirohukelder ( <i>Gunpowder Cellar</i> ), Lossi 28	
24.08.2023	9:00 – 17:00	Conference excursion
25-26.08.2023		Post-conference Tour

## MAPS, VENUES

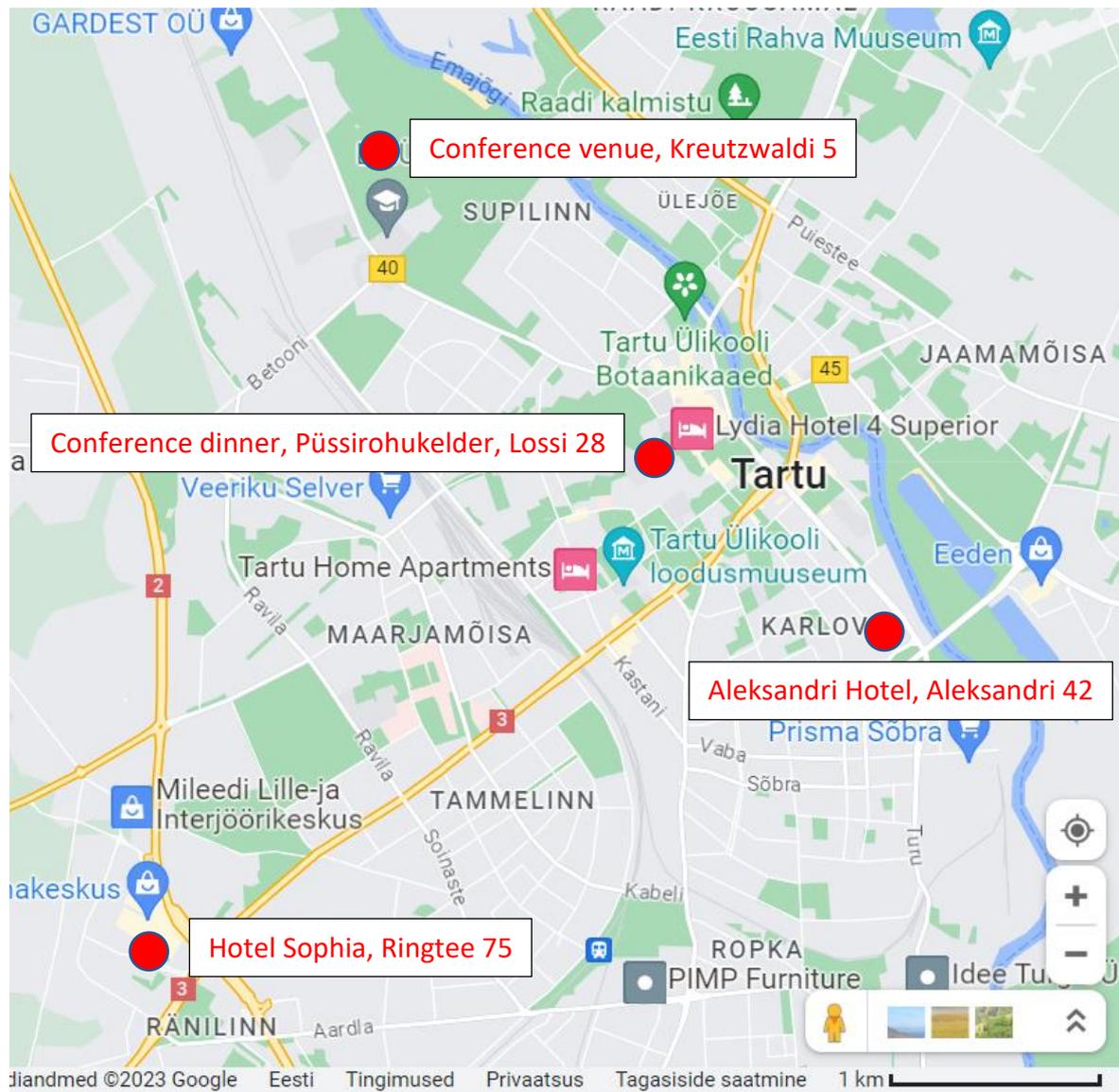
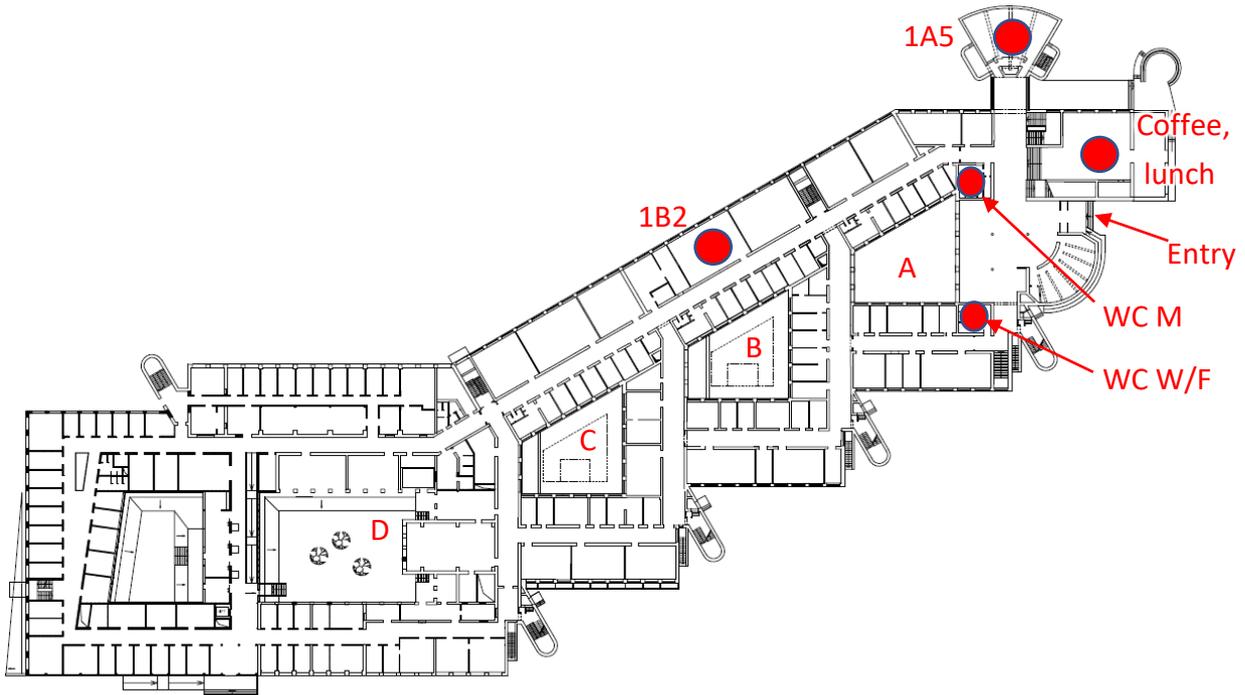


Figure 1. Important places.



**Figure 2.** Conference rooms.

# PRESENTATIONS SCHEDULE

22.08.2023.

Plenary session Room: 1A5

Time	Presentation
9:00 – 9:10	Opening Remarks <i>Ahto Kangur</i> Estonian University of Life Sciences
9:10 – 9:20	Rector address <i>Ülle Jaakma</i> Estonian University of Life Sciences Rector of thr Estonian University of Life Sciences
9:20 – 9:40	IUFRO Small Forestry Group. History, present and future <i>Christoph Hartebrodt</i> Forest Research Institute Baden-Württemberg Chair, IUFRO 3.03.00 Small-scale Forestry
9:40 – 10:10	The development of Estonian forestry and forest policy within last 30 years <i>Meelis Teder</i> Estonian University of Life Sciences
10:10 - 10:40	Understanding family forest owners' perspectives to cross-boundary collaboration <i>Teppo Hujala, Tuomo Takala, Jukka Tikkanen</i> University of Eastern Finland

10:40 - 11:10 Coffee break

Parallel sessions:

Time	1A5	Private forests and climate change (Terhi Koskela)	1B2	Restoration and protection of traditional ways of life, culture and living environment (Ahto Kangur)
	No	Author / Title	No	Author / Title
11:10 - 11:40	A1	<i>Esa-Jussi Viitala</i> Cost-effective actions for climate change mitigation on drained peatlands	B1	<i>Paul Mitchell-Banks</i> Indigenous Derived Forestry Management Practices to Protect Cultural Survival Areas
11:40 - 12:10	A2	<i>Friedrich Reichert, Markus Dög, Bernhard Möhring</i> The assessment of economic losses of private forest enterprises due to recent severe drought and bark beetle calamity	B2	<i>Along (Y.L.) Chen</i> Sacred Space, Traditional Wisdoms and Cultural Resilience of Mountain Indigenous Peoples in Taiwan
12:10 - 12:40	A3	<i>Emmi Haltia, Aleksi Lehtonen, Olli Korhonen, Terhi Koskela, Paula Horne, Kyle Eyvindson</i> Climate change mitigation potential on the fertile drained peatlands – forest owners' willingness to apply continuous cover forestry	B3	<i>Sutida Maneeanakekul, Rochaporn Chansawang, Rasika Angkura, Tippawan Tuekham</i> PANDA Camp: A Small Scale Forest in Thailand for Forest Bathing Tourism

12:40 – 13:40 Lunch

Parallel sessions:

Time	1A5	Family forestry and extension services (Elias Andersson)	1B2	Utilization of forest resources (Dianne Staal Wästerlund)
	No	<i>Author / Title</i>	No	<i>Author / Title</i>
13:40 - 14:10	A4	<i>Anne Matilainen, Merja Lähdesmäki, Outi Hakala, Sami Kurki</i> The impact of forest advisors' values and attitudes on the outcomes of the advisory process	B4	<i>Gundula von Arnim, Amelié von Behren, Bernhard Möhring</i> How do you estimate transaction costs? - An empirical study on transaction costs of private forest owners in Germany
14:10 - 14:40	A5	<i>Kevin W. Zobrist</i> Long term impacts of in-person vs. online education for family forest owners in northwest Washington State, USA.	B5	<i>Dianne Staal Wästerlund</i> The paradox in the dual task assignments of timber buyers
14:50 - 15:10	A6	<i>Jussi Leppänen, Aarre Peltola</i> Silvicultural Activities According to the Finnish Family Forest Owner Survey 2020	B6	<i>Martin Moravčík, Ján Parobek, Miroslav Kovalčík, Hubert Paluš</i> Utilisation of Wood Resources in Slovakia – Cascade Approach
15:10 - 15:40	A7	<i>Elias Andersson, Vilis Brukas, Louise Eriksson</i> Diversifying and finding openings: Co-creating advisory services and planning in Swedish forestry	B7	<i>Zala Uhan, Andrej Udovč, Špela Pezdevšek Malovrh</i> Forest Leases: A Pathway to Mobilizing Wood from Private Forests

15:40 – 18:00 Small excursion in laboratories, Ice breaker

## 23.08.2023

Parallel sessions:

Time	1A5	Ecosystem services and carbon sequestration I (Ahto Kangur)	1B2	Forests for the future I (Christoph Hartebrodt)
	No	<i>Author / Title</i>	No	<i>Author / Title</i>
9:00 - 9:30	A8	<i>Keisuke Toyama</i> Relationship between systems of public forest plan and carbon offset in Japanese private forest	B8	<i>Merja Lähdesmäki, Anne Matilainen</i> Female forest owners as a market segment?
9:30 - 10:00	A9	<i>Emmi Haltia, Jussi Leppänen, Jussi Lintunen, Mikko Peltoniemi, Esa-Jussi Viitala</i> Climate change induced risks for forestry and forest owners' willingness to join the voluntary carbon schemes	B9	<i>Ģirts Baranovskis, Oļģerts Nikodemus, Didzis Elferts, Agita Līviņa</i> Biodiversity-friendly forestry practices: preferences of Latvian private forest owners
10:00 - 10:30	A10	<i>Terhi Koskela, Emmi Haltia, Paula Horne, Annukka Vainio</i> Forest owners' willingness to provide ecosystem services in relation to their forest management choices	B10	<i>Ryoko Ishiaki, Keitaro Sasada</i> Foresters as an interface between forest policy and local people in Japan

10:30 -- 11:00 Coffee break

Parallel sessions:

Time	1A5	Ecosystem services and carbon sequestration II (Ahto Kangur)	1B2	Forests for the future II (Christoph Hartebrodt)
	No	Author / Title	No	Author / Title
11:00 -11:30	A11	<i>Priit Põllumäe</i> Developing new services for forest owners - collaborative tree planting and afforestation as an example	B11	<i>Hanna Muttilainen, Mikko Kurttila, Teppo Hujala</i> Value networks of NWFP producing forest owners in Finland
11:30 - 12:00	A12	<i>Alise Bleive, Jānis Liepiņš, Ieva Jaunslaviete, Kārlis Bičkovskis, Āris Jansons</i> Assessment of stem biomass in deciduous trees with consideration of internal stem decay	B12	<i>Elodie Brahic, Philippe Deuffic, Vincent Banos</i> The hidden side of the presumed inactivity of private forest owners in Southwestern France

Poster session

Time	No	Author / Title
12:00 -12:20	P1	<i>Richard Rimoli</i> Land use evolution and the impacts of forestry intervention zones in Portugal
	P2	<i>Anne Matilainen, Elias Andersson, Merja Lähdesmäki, Gun Lidestav, Sami Kurki</i> Services for what and for whom? A literature review of private forest owners' decision-making in relation to forest-based services
	P3	<i>Marek Uri, Kristiina Aun, Mai Kukumägi, Mats Varik, Hardo Becker, Jürgen Aosaar, Agnes Sepaste, Mikko Buht, Allar Padari, Veiko Uri</i> Transition to selection cutting management in mature stands in Estonia: effect on stand production and development

12:20 – 13:20 Lunch

Parallel sessions:

Time	1A5	Forest owners' cooperation (Aine Ni Dhubain)	1B2	Forest information and governance (Johannes Raher)
	No	Author / Title	No	Author / Title
13:20 -13:50	A13	<i>Áine Ní Dhubháin, Ryan Jeremy</i> The drivers of and catalysts for the formation of Forest Owner Organisations in Ireland	B13	<i>Johannes Raher, Lindsey Norgrove</i> Satellite Remote Sensing for Above-Ground Biomass Mapping of Community Forests: Enhancing Income Streams through Carbon Credits
13:50 - 14:20	A14	<i>Jorge Cunha, Elena Górriz-Mifsud, Alexandra Marques, A. Marta-Costa, José Borges</i> Join management and land consolidation strategies to overcome the challenges of forest land fragmentation in Portugal	B14	<i>Luis Andrés Guillén Alm, Vilis Brukas</i> The thin line between spatial knowledge and environmental governance: how mapping valuable ecological landscapes in Sweden is problematic.
14:20 - 14:50	A15	<i>Johanna Heinemann, Markus Dög, Bernhard Möhring</i> Searching for efficient intercompany cooperatives in German small-scale private forests - A comparative institutional analysis	B15	<i>Sari Pynnönen, Philip Chambers, Annika Kangas, Zampeta Legaki</i> Gamifying forest information systems to support learning and data handling in forest owners' decision-making

14:50 - 15:20 Coffee break

Time	1A5	Challenges for small-scale forestry (Lelde Vilkriste)
	No	Authors / Title
15:20 -15:50	A16	<i>Lelde Vilkriste</i> The role of legislation and support system in the development of private forestry in Latvia
15:50 - 16:20	A17	<i>Philippe Deuffic, Damien Marage, Elsa Richou</i> French forest owners in turmoil. How do they deals with social protests about clearcutting
16:20 - 16:50	A18	<i>Kurt W. Smith</i> Challenges in land retention in the southeastern United States through co-tenancy land ownership
16:50 - 17:20	A19	<i>Meelis Teder, Peeter Vihma</i> The representation of forest owners in collaborative governance platforms: the case of the failure of Estonian national forest programme

# ABSTRACTS

## Plenary session

### THE DEVELOPMENT OF ESTONIAN FORESTRY AND FOREST POLICY WITHIN LAST 30 YEARS

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Estonia is a high forest cover country (53 %, 2.3 million ha) with even public-private ownership share at 51:49. From the total forest area 18,1 % are strictly protected forests, 12,8 % are protection forests and 69% are commercial forests. Within last 30 years, there have been various reforms in forest governance which have direct influence to forest management practices in Estonia. Estonia is a country where the forest act has changed the most: 3 acts and in total 43 different amendments. As of 2019 there were in total 104.3 thousand private forest owners, of what 5918 are companies, the rest are private persons. The average forest holding was 6.6 ha for private persons and 78.6 ha for the company. There are two professions, where according to the forest act a special activity license is needed: forest surveyor and adviser for private forestry.

The presentation introduces the importance of forestry to Estonian national economy, most important forest policy changes and its influence to felling volumes, the development and distribution of private forest ownership, comparison of roundwood prices in Estonia and in neighboring countries, the private forestry support and advisory system.

**Keywords:** Estonia, forestry, forest owner, forest policy, roundwood prices

## UNDERSTANDING FAMILY FOREST OWNERS' PERSPECTIVES TO CROSS-BOUNDARY COLLABORATION

*Teppo Hujala\*, Tuomo Takala, Jukka Tikkanen*

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Fragmented ownership structure of family forest regions creates a challenge for economically viable forest management while calling for landscape-level coordination. Increasing cross-boundary collaboration (XBC) may contribute to profitability of forestry operations and better-connected ecological entities with enhanced ecosystem services. However, owners' varying values and objectives may weaken the opportunities to cooperate across property boundaries. Recent empirical analyses of successes and failures of XBC between family forest owners is lacking. To serve a reasoned impact analysis of XBC initiatives and practices, this presentation summarises earlier academic literature on forest owners' perceptions of XBC and connects those to psychological and utility theoretical concepts that might explain the range of XBC policy responses. Thereafter the presentation illustrates how Vroom-Yetton model may be systematically used to assess XBC initiatives considering primarily the owners' point of view and connecting that to policymakers' and service providers' perspectives. The present contribution sheds light on how concerted cross-boundary collaboration may be made owner-driven and thus contribute to positively perceived XBC activities on family forest lands. It is presumed that such re-invented XBC could exhibit various practical cooperation types from formal to informal ones and a variety of ecosystem, economic, and social benefits.

**Keywords:** Landscape approach, literature review, neighbours, Vroom-Yetton model

# Private forests and climate change

## A1. COST-EFFECTIVE ACTIONS FOR CLIMATE CHANGE MITIGATION ON DRAINED PEATLANDS

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Nutrient-rich peatlands are large carbon stores, but due to peat decomposition, they can also be large sources of greenhouse gas emissions. Most important drivers of the decomposition process are clearcuts and drainage which lowers the water table. The water pollution caused by clearcuts, soil preparation and other intensive management operations in rotation forestry can also be significant.

In boreal forests, continuous cover forestry (CCF) may provide significant potential for mitigating climate change and decreasing nutrient release from peatland forests. This study examines policy measures and economic incentives that can be used to guide private forest owners to adopt CCF in nutrient-rich peatlands. It presents economic calculations of the environmental benefits of such management regime change and examines different ways to design and implement cost-share instruments to incentivise private forest owners decision making. In addition, the study links private forest owners characteristics and preferences to their willingness to participate in new type of cost-share programs that are based of the value of forest-environmental and climate benefits in peatlands.

**Keywords:** Peatlands, climate mitigation, nutrient release, forest management, cost-share programs

## **A2. THE ASSESSMENT OF ECONOMIC LOSSES OF PRIVATE FOREST ENTERPRISES DUE TO RECENT SEVERE DROUGHT AND BARK BEETLE CALAMITY**

*Friedrich Reichert<sup>1\*</sup>, Markus Dög<sup>2</sup>, Bernhard Möhring<sup>2</sup>*

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In the past, private forestry, the largest type of forest ownership in North-Rhine Westphalia (NRW), generated its income primarily through the production of coniferous logs. Due to the loss of large parts of the coniferous stands in NRW, this business model will probably no longer sustain for many small-scale forest enterprises in the future. NRW is considered one of the main damage areas of the persistent drought and bark beetle calamity in Germany, starting in 2018. Much of the mainly affected coniferous forest is situated in privately owned forest, which makes it a forest tenure type particularly affected by the calamity. While the natural damage caused by the calamity in NRW is documented, the economic consequences for affected forest enterprises have so far remained largely unexplored. In order to estimate the economic impact on private forests, several damage factors are calculated, which take into account the main damages and consequential costs caused by calamity. They are derived on the one hand for the private forest in NRW as a whole and on the other hand for seven individual small-scale forest enterprises as case studies for the period from 2018 to 2021. The calculations are based on aerial photo evaluations of calamity areas, interviews of forest owners and data of forest inventories, logging and wood sales.

Overall, private forest enterprises in NRW appear to be severely affected. Those forest owners with a high proportion of spruce at the onset of the calamity and those, who sold their damaged wood at times of unfavourable market conditions, are particularly afflicted. Such hard-hit enterprises will usually not be able to cover the upcoming investment costs of reforestation through the income of damaged timber. The reduced revenues, cost increases and asset losses caused by the calamity are able to threaten the existence of these enterprises.

**Keywords:** Calamity, economic loss, climate change, drought, small-scale forestry, reforestation costs

### **A3. CLIMATE CHANGE MITIGATION POTENTIAL ON THE FERTILE DRAINED PEATLANDS – FOREST OWNERS’ WILLINGNESS TO APPLY CONTINUOUS COVER FORESTRY**

*Emmi Haltia<sup>1\*</sup>, Aleksi Lehtonen<sup>1</sup>, Olli Korhonen<sup>2</sup>, Terhi Koskela<sup>1</sup>, Paula Horne<sup>2</sup>, Kyle Eyvindson<sup>1</sup>*

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Continuous cover forestry (CCF) has emerged as one of the most potential methods to reduce carbon dioxide emissions on drained peatlands. In this study, we analyse the Finnish forest owners’ willingness to apply CCF with the special attention on using it on fertile drained peatlands. The research questions we aim at responding are: What are the main characteristics of forest owner or forest estate that explain the interest for CCF in general and on the drained peatlands? What is the climate mitigation potential of the CCF on drained peatlands, if forest owners who own drained peatland and are willing to change their forest management apply CCF?

The survey data was collected in 2019 and it consists of 2250 forest owners. The response rate of the survey was 42.9 percent. The survey consisted of several sections and included questions about for example, respondents’ characteristics and motives, their current forest management and acceptability of different kind of forest management measures to increase carbon sequestration. The survey responses were supplemented with the information from the forest owner database of the Finnish Forest Centre and the Nation Forest Inventory data. Thus, this data provides detailed information on the forest estates of the respondents, for example the area of the mature drained peatland on each estate. The analyses were conducted with multinomial logistic regressions.

According to the preliminary results, the interest for CCF was strongest among the multiobjective forest owners. The only exception was that the forest owners who emphasized recreational objectives were more interested in CCF on drained peatlands than any other objective group. Satisfaction with the current forest management and cutting practices in Finland decreased the forest owners’ willingness to apply CCF. In the next stage we will extend the analyses to the climate change mitigation potential of CCF on drained peatlands.

**Keywords:** Climate change mitigation, peatland, continuous cover forestry, forest owners

# Knowledge and wisdom of traditional forest practices

## B1. INDIGENOUS DERIVED FORESTRY MANAGEMENT PRACTICES TO PROTECT CULTURAL SURVIVAL AREAS

*Paul Mitchell-Banks*

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British Columbia, Canada, is home to approximately one third of the 630 First Nations (an Indigenous Grouping) communities in Canada and remains a major forestry centre in the country. Ongoing resource development, including oil and gas, mining, power generation, recreation and tourism and forestry continue to constrain the landscape on which Indigenous People carry out their Traditional Practices. Constraints can be both temporal and spatial.

This paper will examine a multi-year process that has a Cdn\$500,000 budget that the author conceived and obtained funding for from the BC Provincial (state) Government and the local forestry industry. The forestry planning project involves working with eight Indigenous Communities from two separate Nations to derive forestry practices that protect known Cultural Survival Areas (CSAs).

Cultural Survival Areas can be grouped into three categories of elements: Things (gravesites, pictographs, pithouse locations, sweathouses); beings (Sasquatch, Little People) and Places and Activities (including but not limited to Xa?Xa?, Heal Oneself, Training, Puberty, Spirit, etc.). These are some of the most culturally sensitive and critical cultural elements of the Nations and have been under significant destruction and impairment through Land and Resource Planning and Management not considering them.

The paper will focus on the planning process, planning elements and strategies, and lessons learnt from the project to date. Where given permission, the author will share specific forestry management practice recommendations and explain why they were identified and championed by the participating First Nations communities.

**Keywords:** Indigenous Protection Culture Forestry Cooperative Government Industry

## **B2. SACRED SPACE, TRADITIONAL WISDOMS AND CULTURAL RESILIENCE OF MOUNTAIN INDIGENOUS PEOPLES IN TAIWAN**

*Along (Y.L.) Chen*

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Many academic studies point to Taiwan as the origin of the vast Austronesians, which has been in Taiwan for more than 8,000 years and are the oldest indigenous people. During the Japanese colonial period (1895-1945), the Japanese government dominated the entire island and began forced evictions of many tribes from high mountain forest areas to hilly plains. Most indigenous land still belongs to state from the policy of Nationalization of forest enacted by the Japanese government. Taiwan's next ruler (KMT regime & DPP party) kept on the indigenous policy.

I will a old settlement S'gadan belongs to the Teruku People, was relocated from the mountain area, above 1,000 meters, to the foot of the mountain by the KMT regime government during 1977-79. During the 1980s, some inhabitants began to go back to their old homesteads to rebuild their traditional bamboo and wood housing. They use traditional wisdoms of forest practices in mountain area to preserve the ecological living of cultural resilience. To return to the old community sites from the foot of the mountain it takes about 4 hours of walking on small and steep trails. Unfortunately, these mountain areas were designated as being within Taroko National Park in 1986, and as such gathering and hunting were prohibited.

Today, linking the mountain life with small-scale farming in the mountains, providing a homestay experience for mountaineers is an important source of income. Despite it was difficult and long distance within vertical and dangerous mountain, they still choose to go back and forth between old settlements and modern villages to keep a lifestyle of health and sustainability. In short, these cases will remind the state and mainstream society "can we live together?" and shows us an 'Original Affluent Society' with traditional wisdom in modern life.

**Keywords:** Cultural survival, Resilience Governance, gathering-Hunting Cultures, Original Affluent Society, Nostalgia

### **B3. PANDA CAMP: A SMALL SCALE FOREST IN THAILAND FOR FOREST BATHING TOURISM**

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Family forest is defined as a collection of biodiversity on family-owned land, either a family-created forest or a natural forest that already exists on the family's lands conserved by the family. Panda Camp in Uthai Thani Province, Thailand is a family forest with a total forest area of 40.64 hectare, owned by Mr. Siripong Tho-Nongtor. The original land was a rice field with a natural creek in the forest area, but with the concept of his desire to have a house in the middle of the forest, to have vegetables, fruits, and herbs around the house for eating and using forever, to listen to the sound of nature, and be close to the nature; therefore, began to grow plants, imitating nature, planting the perennial trees and growing other plants to have more varieties and different types of plants planted together to form a forest structure similar to natural forests in general.

From the research on A Guideline to Develop Forest Bathing Model in Thai Tourism Context, by conducted action research and analysis. It was found that this family forest, Panda Camp, has a high potential to be an area for organizing forest bathing activities for tourism due to the diversity of both trees and plants including perennials, fruit trees, various herbs and spices, with a shady atmosphere covered with large trees and cool weather. The back area has a small creek that flows through causing participants to feel relaxed and calm, so the activities can be held at various times and in different seasons, as well as the process of forest bathing. In addition, those with expertise in the area also have communication skills, able to lecture/lead activities in both Thai and English, as well as have good communication techniques to tell stories.

**Keywords:** PANDA Camp, A Small Scale Forest, Forest Bathing, Thailand

# Family forestry and extension services

## A4. THE IMPACT OF FOREST ADVISORS' VALUES AND ATTITUDES ON THE OUTCOMES OF THE ADVISORY PROCESS

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Several studies have analyzed the factors affecting the outcomes of forest advisory processes. Some have considered the role of the forest owners as a target group, while others have concentrated on the importance of tailoring the advising processes and methods for different kinds of forest owner types. However, significantly less focus has been put on the forest advisors' role, even though their impact on the advising process is equally important.

The forest advisors' personality, values, attitudes, and behavior influence how and what information is brought to the discussion with forest owners, which in turn impacts on the success of the advising process. Through understanding the effect of these issues, service providers can consciously change their advising methods to improve their performance.

The aim of this study is to understand how the forest advisors' personal opinions, attitudes and values influence the advising outcome. For this, an e-questionnaire was sent out to the Finnish Forest Centre's advisors (n=50). In addition, the characteristics of the advised forest owner, outcome of the advising process in a form of implemented forest management activities, the used contact method as well as the general customer feedback were collected from the Forest Centre's database. The data was analysed by using statistical methods. The results revealed that the more positive opinion the advisers had on the forest owners' own skills and knowledge regarding forest related issues, the better was their success rate in the advising process. In addition, the advisor's age and sex compared to the ones of advised forest owner had an impact on the success rate.

**Keywords:** Private forest owners, forest advisors, advising process, attitudes, values, personality

## **A5. LONG TERM IMPACTS OF IN-PERSON VS. ONLINE EDUCATION FOR FAMILY FOREST OWNERS IN NORTHWEST WASHINGTON STATE, USA**

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Washington State University Extension offers a multi-week forestry course for family forest owners called Forest Stewardship Coached Planning. This comprehensive course teaches best management practices for family forests, with topics that include native trees, ecology, forest health, wildlife, soils, silviculture, invasive species, climate change, and special forest products. Participants are “coached” in the writing of their own personalized forest management plan. Thirty-four in-person courses were offered in northwest Washington during 2008 – 2022, and 16 online courses were offered during 2012 – 2022. Follow-up surveys were sent to participants one, three, and eight years following each course to assess long-term impacts of behavior and condition change. This presentation summarizes the results of those surveys. The results demonstrate that these education programs have significant impacts on behavior change, with over 85% of participants implementing new practices within one year of taking the course. Three-year survey results demonstrated condition changes, with respondents reporting income generation, improved environmental conditions, and improved quality of life based on what was learned in the course. Eight-year survey results demonstrate sustained impacts, with over 95% of respondents reporting that the course helped meet their objectives and that they are still benefiting from it eight years later. The results show that both the online and in-person courses have similar long-term impacts. The only major difference is that online participants are less likely to complete a written management plan. With the proliferation of online landowner education programs due to the COVID-19 pandemic, it is important for educators to understand how a shift to online learning might change program impacts. This study demonstrates that online education of family forest owners can be just as impactful in the long term as traditional in-person education programs.

**Keywords:** Family forestry; education impacts; online learning

## A6. SILVICULTURAL ACTIVITIES ACCORDING TO THE FINNISH FAMILY FOREST OWNER SURVEY 2020

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Family forest owners are carrying out several silvicultural activities by themselves. As forest owners do not need to report their work volumes, self-employment may be a challenge for statistical purposes and further for national monitoring of sustainability in forestry. In Finland, silvicultural statistics are primarily based on volume of outsourced works ordered for or by family forest owners. These works are also often associated with public support for forestry works. In this study, we combine Finnish Family Forest Owner 2020 survey responses from years 2016-2018 with administrative data on financial support for silvicultural and forest improvement works in Finland. The objective of the study is to obtain the full picture on silvicultural activities taking place in family forests. According to the survey results family forest owners' silvicultural works in their own forests are of significant volumes. On the other hand, the results reveal that according to survey responses some forest owners do not have information of or remember all outsourced works in their forests.

**Keywords:** Silviculture, self-employment, outsourcing, family forestry, survey method, administrative data

## **A7. DIVERSIFYING AND FINDING OPENINGS: CO-CREATING ADVISORY SERVICES AND PLANNING IN SWEDISH FORESTRY**

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The demand for diversified forestry in Sweden has been widely acknowledged for a long period, but its realization is lagging, highlighting the need for substantive changes in implementation. Previous studies have underlined the dominant and hegemonic position of present regime that hampers innovations of forest management. By scrutinizing and challenging present procedures for forest advisory services and planning, the project aims at contributing to more diversified management that better matches forest family owners' needs and societal goals. This is done by (1) investigating how forest owners acquire and create knowledge about alternative management methods; (2) examining ways to make systemic improvements in forest advisory services to promote diversified forest management; and (3) piloting enhanced procedures in forest planning that better match owners' goals and promotes forestry diversification. The inquiry will be combining forest owner surveys, interviews on organizational strategies, participatory case studies with private and public actor, participatory action research with women forest owner networks and piloting novel planning approaches on case estates. Supported by knowledge management theory, the project takes a forest pluralist approach to explore behavioral, organizational, technological, socio-ecological challenges and openings for transformative as well as incremental changes towards a more diversified forest management, as well as the condition of agonism in forest-related knowledge production, participatory processes, management, service provision and planning. Besides scientific publications, the project outputs will be forest management plan prototypes, training modules for forest advisors and planners and a collaborative book on forest pluralism.

**Keywords:** Advisors, planners, forest owners, forest management, pluralism, Sweden

# Utilization of forest resources

## B4. HOW DO YOU ESTIMATE TRANSACTION COSTS? - AN EMPIRICAL STUDY ON TRANSACTION COSTS OF PRIVATE FOREST OWNERS IN GERMANY

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It is known that small-scale forest owners fall short of their forest utilization potential. This is often reasoned by a socioeconomically driven goal of preserving the forest value for their descendants. Their behavior could also be explained by the costs they need to incur to participate in the forest market, considered as transaction costs. Transaction costs belong to any economic activity, but they are specific, individual and not easily generated – especially for small-scale forest owners. Applying the transaction cost theory on small-scale forestry could open new solutions for mobilizing forest owners. Therefore, the aim of our study is to define transaction costs for small-scale forestry, to evaluate their impact on harvesting decision-making, and to estimate them empirically.

Firstly, we performed a literature review and expert interviews to build a concept for estimating transaction costs for small-scale forestry. Next, a harvest decision model was created to estimate the impact and the relationship of transaction costs and forest owners' behaviors. Finally, we conducted an online survey to gather empirical data on transaction costs for private forest owners in Germany. Analysis of literature exhibited the need for an empirical study on transaction costs. The implementation of transaction costs to the model showed an apparent effect on the behavior of forest owners. Increasing costs reduce the activity of forest owners and intensify the logging measure. The online survey confirmed these results. The expert interviews showed that existing basic management structure, larger forest area per forest owner or measure, and outsourcing to professionals lead to less transaction costs for forest owners. In contrast, determinants like smaller forest estates, or less education on forestry and a "do-it-yourself" strategy promote higher transaction costs. This study emphasizes the importance of reducing transaction costs and the improvement of market efficiency and access, especially for small-scale forest owners.

**Keywords:** Transaction cost, small scale forestry, non-industrial private forest owners

## **B5. THE PARADOX IN THE DUAL TASK ASSIGNMENTS OF TIMBER BUYERS**

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For the majority of forest owners in Sweden, their major contact person at a forest organization is somebody whose primary assignment is to buy timber. Timber buyers' job descriptions tends to be very diverse. Besides doing business with forest owners they also to offer advice on forest management and may play major roles in the local representation of their organization. As the competition for timber is high, timber buyers need to be skilled in understanding the owners' management objectives and translate these into useful advice. At the same time they have to close profitable timber deals. Several studies show that timber buyers have difficulties juggling these dual roles. Their performance is mainly evaluated in the volume they obtain as well as the number of contacts they make with forest owners. Yet in their opinion their major role is to give advise to the forest owners. Time constraints are often mentioned as a factor that limits timber buyers to obtain the quality in their work they aim for. They also lack tools that would help them to structure their tasks. Forest owners on the other hand question if their objectives are in focus when discussing a timber deal

**Keywords:** Service quality, target confusion, timber deal, advice

## B6. UTILISATION OF WOOD RESOURCES IN SLOVAKIA – CASCADE APPROACH

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The world's leading forums to fight climate change support the production of wood and wood products produced in a sustainable and ecological way. By sequestering carbon in harvested wood products (HWP), global warming can be significantly mitigated. Several measures were taken in the new national forest program of the Slovak Republic to extend the period of carbon storage in HWP. Financial support is also proposed for the preferential use of by-products (chips, sawdust, shavings, cuttings, etc.) of wood processing, primarily for the production of wood-based agglomerated materials (AM) and pulp products. This should contribute to changing the current (non-ecological) practice of prevailing use of wood by-products for energy production. The measures are aimed at supporting the cascade processing and use of wood with the order of preference: mechanical processing – chemical processing – end-of-life product recycling – energy utilization; thereby extending the life cycle of the wood and subsequently carbon sequestration in the HWP. To examine the current status of the utilization of wood by-products in branches of primary wood processing, we conducted a questionnaire survey for two main product groups: 1) sawmill products and 2) wood large-scale materials (veneers, plywood and AM). The empirical survey was evaluated using expert data analysis with the presentation of the following results: quantification of volumes of sources and production (including by-products) by type and its subsequent use (for industrial processing or for energy); approximation of results for the conditions of the entire SR including calculation of cascade coefficient values. The findings should serve as a basis for optimizing the current use of wood by-products in accordance with circular bioeconomy and cascade wood use approaches.

**Keywords:** Cascade utilisation of wood, wood by-products, energy utilisation, industrial processing

## **B7. FOREST LEASES: A PATHWAY TO MOBILIZING WOOD FROM PRIVATE FORESTS**

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European forests are mostly (56 %) owned by private forest owners (PFOs). Due to the socio-economic and structural change, there is a great deal of heterogeneity among PFOs, which is reflected in a growing share of non-traditional, urban, passive or absentee PFOs, whose objectives are not purely economic or production oriented. In the last two decades numerous forest-related policy documents have been adopted at European and national level, addressing environmental and biodiversity challenges and aiming at sustainable use of natural resources and climate change mitigation. These documents recognize the importance of forests, the forest sector and the forest-wood chain in achieving climate neutrality by 2050. To achieve these ambitious policy goals wood mobilization from private forests is necessary and can be achieved through long-term business cooperation (e.g., forest leases) between PFOs and forest managers. In Slovenia, private forest prevails (77 %), which are small scaled and fragmented. Consequently, felling in private owned forests lags the allowable felling. In this research, interviews (n=7) were conducted with forest managers who have signed long term forest lease contracts with PFOs in Slovenia. The results showed that the potential of forest leasing could be an efficient way to mobilize wood from private forests, but this business model was found to be particularly suitable for large-scale forest owners, who do not engage in forest management activities. However, this type of business model is not very common in Slovenia. The main reasons are a lack of trust of PFOs, a lack of information and examples of good practices and inefficient operational environment that neither promotes nor accelerates this business model. If we want this business model to succeed in Slovenia (where small scale and fragmented forest properties prevail), policy instruments must first encourage PFOs to cooperate in joint forest management.

**Keywords:** Forest leasing, wood mobilization, private forest owners

# Ecosystem services and carbon sequestration

## A8. RELATIONSHIP BETWEEN SYSTEMS OF PUBLIC FOREST PLAN AND CARBON OFFSET IN JAPANESE PRIVATE FOREST

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In Japan, small-scale private forest owners can submit forest management plans for their local authorities and obtain subsidies to forestry operations such as thinning. However, forest owners whose forestry condition is severe and its profitability is poor has difficulties to submit forest management plans because utilization of thinned logs is the prerequisite to receive subsidies, and cover ratios of submitted forest management plans are quite low in some prefectures. In addition, such combination of forest management plan and subsidy is not an effective incentive for forest owners who intend to conduct clearcutting. The forest management plan is also the prerequisite to obtain publicly authorized carbon credit, and the amount of issued credit is still limited. Simulations showed that the financial motivation of obtaining carbon credit was relatively high in cases where forestry profitability is moderate, incentive of clearcutting is not large, and the effect of thinning subsidy is high. In a scenario where replantation of clearcut woodland become obligatory, incentive of clearcutting decreased and motivation of obtaining carbon credit increased.

**Keywords:** Japanese private forest, forest management plan, carbon credit, thinning subsidy

## **A9. CLIMATE CHANGE INDUCED RISKS FOR FORESTRY AND FOREST OWNERS' WILLINGNESS TO JOIN THE VOLUNTARY CARBON SCHEMES**

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Forest carbon sinks can play an important role in mitigating climate change globally. The voluntary carbon schemes are a promising policy tool for incentivizing forest owners for increasing the carbon sinks. The success of the voluntary scheme is, however, dependent on the forest owners' willingness to join the scheme. According to the earlier studies, forest owners are interested in increasing the carbon sink in their forest for monetary compensation, but long contract periods or other limiting contract features may reduce the interest substantially.

The attractiveness of carbon scheme depends on forest owner's monetary and nonmonetary preferences, but also on her/his risk attitude. While the scheme may increase the earnings from forestry, the changes in management may increase the risk of natural disturbances like wind damages and insect outbreaks. Since the increase in expected earnings is associated with increased risks, the forest owners' risk attitudes can influence the willingness to join the scheme. In this study we examine the impact of the forest owners' risk attitudes and their other characteristics on their willingness to join the voluntary carbon schemes. We compare two different types of the compensation schemes: in the first one the forest owners are compensated for lengthening the rotation period and, in the second one the compensations are based on the amount of carbon sequestered into the forest.

The survey data will be collected in April 2023. The electronic survey questionnaire will be sent to 10 000 forest owners randomly sampled from the Finnish Forest Centre's database. In the survey, we use both contingent valuation and choice experiment methods to evaluate the forest owners' willingness to accept compensation for the carbon scheme. The results of the survey will be presented in the conference.

**Keywords:** Carbon scheme, action based, result based, risks, willingness to accept

## A10. FOREST OWNERS' WILLINGNESS TO PROVIDE ECOSYSTEM SERVICES IN RELATION TO THEIR FOREST MANAGEMENT CHOICES

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Forests are subject to many policy objectives and pressures concerning carbon sequestration, biodiversity protection and timber production. Private forest owners have an important role in production of forest ecosystem services in Finland, because more than half of the productive forest land is family-owned.

In this study forest owners' willingness to sell carbon sequestration services and nature values is examined in relation to their activeness in forest management and timber sales, as well as forest owners' and forest holding characteristics and interest in implementing measures to safeguard biodiversity. The analysis is conducted with logistic regression analysis.

The study is based on a sub-sample (n = 2 250, response rate 43 %) of national postal survey data collected from forest owners in 2019 in the Finnish Forest Owner 2020 project.

The preliminary results show that about half of forest owners would be interested in selling ecosystem services, either as a carbon sequestration service or by establishing a nature conservation area. Most often forest owners considered timber production to be the most important benefit produced by forests, both for forest owners themselves and especially for the whole society. Carbon sequestration and habitats for plants and animals were rated as an important benefit for Finland more often than for the forest owner her/himself.

Forest Biodiversity Program for Southern Finland (METSU) offers family forest owners an option to voluntarily protect ecologically valuable forest sites and receive compensation for that, but it does not include an instrument to compensate forest owners for producing carbon sequestration services. Need to develop incentive systems to increase carbon sequestration in private forests is evident. The results of the research can also be utilized in targeting the counseling related to the sale of the carbon sequestration service and nature values, as well as the reconciling of different uses of forests.

**Keywords:** Biodiversity, carbon sequestration, ecosystem services, forest management, forest owners

## **A11. DEVELOPING NEW SERVICES FOR FOREST OWNERS - COLLABORATIVE TREE PLANTING AND AFFORESTATION AS AN EXAMPLE**

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The European Commission unveiled the European Green Deal, a roadmap for Europe becoming a climate-neutral continent by 2050. The roadmap consists of a variety of specific sectoral policy aims with a variety of instruments being developed. These include the 3 billion tree pledge and guidances for biodiversity-friendly tree planting and afforestation. This is all despite during the last 30 years, forest land cover has increased by 10% while still 39% of Europe consists of arable land and grasslands which are vital for food security. The desire and demand to increase carbon sequestration in the land use and forestry sector is increasing. And the interest is nowadays coming also from the private sector.

In Estonia, forests cover more land compared to the EU average. We've gained forest cover at the expense of grasslands and arable lands and vice-versa. But also, we've lost forest to infrastructure developments and settlements. It is nevertheless estimated that we should currently have 75 000 – 160 000 ha of areas with afforestation and tree planting potential. These lands are mostly privately owned. Private landowners might have small interest in afforesting small patches of land as the direct and indirect costs are theirs to bare. However, these new policy targets and increased interest from private organisations towards supporting tree planting and afforestation gives forest owners associations an opportunity to develop a new collaborative service to landowners. For landowners it is an alternative in increasing the value of their property with minimum or no cost.

Since 2021 the Central Cooperative of Private Forests has piloted such a collaborative service for tree planting and afforestation. With the support from the Environmental Investment Centre, we've been developing a business model and relevant infrastructure to bring such a cooperation platform to life. It involves regional forest owners' associations and their central co-operative, landowners and private companies and organisations who financially support the activities. During the piloting phase, we've involved 2 companies, 7 landowners and have planted 4251 seedlings on some 3-4 hectares of land. This initiative brings mutual benefits to all involved.

**Keywords:** ecosystem services, forest owners' association, forest management, forest investment

## A12. ASSESSMENT OF STEM BIOMASS IN DECIDUOUS TREES WITH CONSIDERATION OF INTERNAL STEM DECAY

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Carbon sequestration and emission calculations, along with carbon trading, have become more prominent in recent years. The management of carbon sequestration in privately-owned forests plays a significant role in the overall carbon balance to achieve carbon neutrality. However, the amount of carbon absorbed by forests may be overestimated if carbon lost through internal decay in living trees is neglected. Wood decay is a natural process caused by fungi and affects mostly lower parts of mature and overgrown trees, resulting in the release of carbon dioxide back into the atmosphere. This study aims to develop a methodology for evaluating the impact of the stem internal decay on the birch, European aspen, common alder and grey alder forest stand biomass and carbon stocks.

To investigate the health status, trees were micro-drilled in three axes at stump level. The 190 tree stems were cross-cut into 1 m sections to measure the extent of the decay within each of the stem. Two types of decay were distinguished from the cross-cut discs to collect the specimens for basic density and carbon content analysis. In total, the density for 1350 discolored wood and 1170 spongy rot specimens were measured and the carbon content was determined for more than 900 samples. By integrating decay reduction measures into forest management, we enhance carbon sequestration potential, mitigate climate change, and ensure forest sustainability. We found that presence of internal decay can reduce tree stem biomass up to 18 % (300 kg) for studied trees. The results of this study suggest that decrease in wood density due to internal decay must be considered in the stem biomass calculations, especially in mature and overgrown stands, that is an important step in reducing the uncertainty in the estimation of forest biomass and carbon stocks.

**Keywords:** Wood decay, deciduous trees, wood density, carbon content

# Forests for the future

## B8. FEMALE FOREST OWNERS AS A MARKET SEGMENT?

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Forest owners' values and objectives for their forests have become more varied. This naturally impacts their interest towards utilizing their forests and consequently also their interest in purchasing forest management services. Consequently, as forest owners cannot be considered as homogenous a group as previously, forest management service enterprises must find alternative ways to tailor their communication to reach forest owners and to market their services to forest owners who may have considerably different values and objectives than previous generations. All this development highlights the need for service providers to better segment their clientele. Segmentation can be defined as the process of dividing existing markets into smaller, distinct subsets of customers that behave in a similar manner, have similar needs, and who can then be reached with a distinctive marketing strategy. Market segmentation thus helps firms better understand and meet their customers' needs, and therefore enhance business profitability and competitiveness by concentrating their marketing energy. However, a surprisingly small amount of research has focused on the impact of marketing arguments for various forest owner segments.

Our study contributes to this discussion by analyzing, through a real-life marketing intervention, how effective various marketing messages are for promoting forest management services to a certain forest owner segment. The selected service is first thinning, and the market segmentation is based on gender. The empirical data is gathered through three marketing messages that were created and sent out to 300 female forest owners in Finland. The results indicate the successfulness of different marketing messages, based either economic or environmental arguments, in raising interest towards the first thinning service among female forest owners.

**Keywords:** Market segmentation, female forest owner, marketing argument

## B9. BIODIVERSITY-FRIENDLY FORESTRY PRACTICES: PREFERENCES OF LATVIAN PRIVATE FOREST OWNERS

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The European Union (EU) Biodiversity Strategy for 2030 emphasizes that biodiversity-friendly practices such as *closer-to-nature-forestry* should be further developed.

There are more than 110 000 private forest owners in Latvia, who manage half of Latvian forests. Therefore, the success of forest biodiversity conservation will largely depend on the decisions and forestry practices made by private landowners.

We conducted a mixed-mode (paper and web-based) survey (n = 599) in 2021 to explore private forest owners' attitudes towards biodiversity conservation strategies regarding their properties. The survey targeted private forest owners already facing biodiversity-related forestry restrictions (e.g., forests located in protected areas) (61%) and forests with significant biodiversity values (e.g., forest habitats of EU importance) (33%).

The results show that a significant number of private forest owners would be interested in applying additional biodiversity-friendly forestry practices if appropriate advisory and financial support were provided. Forest owners were relatively more likely to accept additional forestry restrictions during the bird breeding season among various potential biodiversity conservation measures. Female forest owners were more supportive of forest biodiversity conservation measures on private land. Respondents owning a smaller forest area and owners less dependent on forestry income were more willing to dedicate a significant proportion of their forests to biodiversity conservation goals.

Our results suggest that biodiversity conservation institutions are not the primary information source for private forest owners regarding forest biodiversity conservation measures. Forest owners are most likely to listen to institutions responsible for forestry activities. Consultations as practical training on biodiversity-friendly forest management should be organised on the ground in the forest in cooperation with forest and nature conservation experts.

Our study highlighted the importance of a cross-sectoral approach regarding the integration of private forest owners into biodiversity conservation strategies. Competent, understandable, and reliable communication is essential for forest owners to make decisions about preserving natural values.

**Keywords:** Private forests; biodiversity conservation; forest owners; protected areas; forestry practices

## **B10. FORESTERS AS AN INTERFACE BETWEEN FOREST POLICY AND LOCAL PEOPLE IN JAPAN**

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With recent rapid changes in the forestry industry, the role of foresters as a de facto interface between forest policy and local people is becoming increasingly important. Small-scale forestry, in particular, is characterized by diverse goals and motivations and insufficient scientific knowledge and requires more support from foresters to achieve appropriate forest management. However, the government has not always prioritized the role of foresters, as the number of foresters and the size of subsidies have diminished, and the gap may be widening between extant policy and local conditions. In this presentation, we will examine the challenges to supporting small-scale forestry in modern society by examining the status of Japanese foresters who implement forest policy at the local level. To this end, we used literature and government statistics to understand past changes and conducted questionnaires with forest administration officials in prefectures and municipalities all over Japan to understand the present situation. The results revealed that decentralization, which was intended to generate locally based policies, has weakened the interface between forest policy and local people, and that currently, foresters face significant challenges to their expertise and workload.

**Keywords:** Forester, Forest policy, Municipality, Prefecture, Decentralization, Japan

## **B11. VALUE NETWORKS OF NWFP PRODUCING FOREST OWNERS IN FINLAND**

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Non-wood forest products (NWFPs) are products of biological origin other than wood derived from forests (e.g. berries, mushrooms, chaga, birch sap and spruce sprouts). NWFPs, like berries and mushrooms are commonly known and used in households for food and nutritional diversity. These and a wide variety of other NWFPs are used increasingly in the food sector, cosmetics, and healthpromoting products at the local, national, and international markets. Still, NWFPs are a minor forest product in terms of their direct monetary value compared to timber, despite their potential use in products with high added value. In Finland, most NWFP enterprises are single-person or family owned small or microenterprises with limited resources. In this, the key issue is to have adequate cooperation networks, from which there is only little research information available. The aim of the study was to describe value networks of forest owners producing NWFPs and to identify intangible and tangible value exchange within the network. The study was based on qualitative in-depth interviews collected from twenty forest owners in Finland. Thematic coding and SNA analyses were used to analyse the data from the interviews to reveal the essential actors, their connections and value exchange. According to preliminary results, the role of buyers and forest organizations was emphasized in the networks of forest owners. However, connections to natural products organizations were rare. Forest owners sought information from forest organizations and research and education institutes. Social value and support gained from peers was also significant. The results indicate that low-threshold organization for information sharing and guidance would be needed in NWFP sector. The study increases the understanding of the heterogenic and multidimensional value networks of NWFPs and makes the development targets in the NWFPs value networks visible.

**Keywords:** Non-wood forest products, forest owners, value networks, value exchange

## **B12. THE HIDDEN SIDE OF THE PRESUMED INACTIVITY OF PRIVATE FOREST OWNERS IN SOUTHWESTERN FRANCE**

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In line with the objective of the European commission to increase the share of renewable energy, the French National Forest Program (2016-2025) aims to increase wood harvesting. To reach this objective, we need to understand private forest owners' real intentions to harvest more wood as private forest owners (PFOs) are often accused of immobilism and not always playing the game of wood mobilization programmes. Our paper deals with the alleged forest owners' inactivity in depth by refining the diversity of practices and attitudes hidden behind "inactive" forest owners' categorization in the French context. The survey was carried out in an "under-exploited forest" located near the "Landes de Gascogne" Region (Southwestern France), described as the largest cultivated private forest in Europe. Besides common variables generally used in PFOs typologies (i.e., mainly objectives, values, stated intentions), other variables related to actual behaviors –through management practices effectively implemented– were added to bring the objectives/intentions and the actions/practices face to face. A first step of variable clustering (ClustOfVar method) gives an understanding of the forest management through six clusters related to the objectives, the behaviors, the difficulties and the expectations of the PFOs. Then, the typology highlights a diversity of engagement in forest management, without considering the productive aspect as the central point of this management. Our results allow to see how PFOs position themselves with respect to economic and environmental aspects. Finally, we show that the so-called "inactive" PFOs do not necessarily lose interest in their forest. Some of them are even asking for technical references and services allowing them to reconcile biodiversity and wood-energy and thus to participate more actively in forest policy programmes, be they wood energy or biodiversity conservation oriented.

**Keywords:** Private forest owners, practices, forest management, typology, variable clustering, France

## Forest owners' cooperation

### A13. THE DRIVERS OF AND CATALYSTS FOR THE FORMATION OF FOREST OWNER ORGANISATIONS IN IRELAND

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In the Republic of Ireland (ROI) recent decades have witnessed substantial afforestation, a rapid increase in total forest area and the increased prevalence of small scale and dispersed private forests in the national forest estate. In the absence of a history of private forest ownership, forest owners face social, technical and economic challenges. Mechanisms for multi-owner co-operation create opportunities for individual forest owners to address these challenges. The principal means by which individual private forest owners achieve such co-operative action is the private Forest Owner Organisation (FOO). We investigated the drivers of and catalysts for FOO formation in the ROI by conducting semi-structured, qualitative interviews with 39 interviewees, the majority of whom were FOO members. Thematic analysis of the qualitative data revealed ten prominent socioeconomic drivers and catalysts of collective action. In common with previous studies, we found that FOOs formed to promote the economic interests of their members, address knowledge deficits and passivity among independent forest owners and to create greater awareness of the total role and contribution of private forestry. However, our findings suggest overcoming widespread rural social isolation and rural social conflict as additional and prominent drivers in the formation of forest owner interest groups in the ROI.

**Keywords:** Forest Owner Organisations; small-scale ownership; drivers; catalysts

## **A14. JOIN MANAGEMENT AND LAND CONSOLIDATION STRATEGIES MANAGEMENT AND LAND CONSOLIDATION STRATEGIES TO OVERCOME THE CHALLENGES OF FOREST LAND FRAGMENTATION IN PORTUGAL**

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Portugal is the European country with the highest percentage of private forest, of which around 86% is owned by small owners, characterized by a high level of fragmentation of forest property, with impacts on economic viability due to its small size. Nevertheless, Portugal has one of the highest rates of added value of forestry and logging in Europe considering the proportion of forest area available. The effectiveness of forest management in small-scale areas depends to a large extent on how the forest owners are structured and how they can organize their decision-making processes. In these past decades, several strategies were design and implemented to promote join management. Most of them are developed in a top-down approach, triggered by public policies and funding. This study proposes a characterization of these various strategies for the consolidation of ownership and join management that have been adopted in Portugal in the past decades. The emphasis is on the characterization of the organizational structures and models of join management that seems to be the most adequate to overcome the limitations of the fragmentation of forest property in Portugal. For this, a new conceptual model was defined and a review of existing strategies in Portugal was carried out. A survey was also carried out to forest owners' organizations to get their perception, experience and motivation to participate in strategies of land consolidation to promote sustainable forest management.

**Keywords:** Land fragmentation, join forest management, land consolidation, private forest ownership

## **A15. SEARCHING FOR EFFICIENT INTERCOMPANY COOPERATIVES IN GERMAN SMALL-SCALE PRIVATE FORESTS - A COMPARATIVE INSTITUTIONAL ANALYSIS**

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The relevance of wood supply in small-scale private forests (<20 ha forest ownership) is increasing due to rising wood demands. Given that such forests comprise 24% of Germany's total forest area, there are high utilization potentials. Additionally, forest protection and climate adaptation are becoming more important. This requires forestry management. However, observations show that management in small-scale private forests is associated with challenges. This is often related to difficulties involving area size, fragmentation, and lack of expertise. Forest management cooperatives are one approach to solving these problems.

However, these organizations also face challenges: High management costs due to small scale, lack of staff, and generational change in voluntary work complicate joint management. Therefore, these forms of organization must be questioned as sustainable business models, as many organizations cannot finance themselves through their economic activities alone.

So, what are efficient structures which reduce the costs of the organization in joint management? Using approaches from new institutional economics - transaction cost theory, efficient institutional arrangements will be identified based on structures and processes. Using comparative institutional analysis, real-world institutional arrangements are compared based on their transaction and production costs for wood supply processes. This allows conclusions to be drawn about organizational efficiency. Qualitative interviews with a semi-structured guide are thus conducted with decision-makers in forest management cooperatives and evaluated by process analysis regarding their transaction and production costs.

First interview results in forest management cooperatives show that, by changing the institutional arrangement, transaction costs can be influenced, and processes and institutions become more efficient.

A particular strength of this study is its novel approach of combining the analysis of transaction and production costs and their interplay from the perspective of entire process chains. The results provide approaches for the efficient design of forest management cooperatives for wood supply in small-scale private forests.

**Keywords:** Forest Management Cooperatives, wood Supply, transaction costs, comparative institutional analysis

## Forest information and governance

### B13. SATELLITE REMOTE SENSING FOR ABOVE-GROUND BIOMASS MAPPING OF COMMUNITY FORESTS: ENHANCING INCOME STREAMS THROUGH CARBON CREDITS

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Forests are an essential contributor to food security and income generation in many parts of the tropics. Community-managed Forest areas offer an opportunity to combine the conservation and economic use of forests by local actors. Communities can diversify their income streams by proofing sustainable use and participating in a carbon credit program. However, monitoring above-ground biomass (AGB) and carbon stocks in these plots can be challenging and costly. Thus, a narrative review was conducted of satellite remote sensing methods for assessing AGB on a plot level with the aim to reduce monitoring costs and enhance the feasibility of carbon projects.

Optical multispectral sensors, such as Landsat and Sentinel-2, provide valuable data for estimating AGB in these plots. However, precision and saturation issues need to be addressed. Higher-resolution optical data from commercial constellations such as RapidEye and Dove can offer more detailed information but may imply higher costs. The incorporation of Synthetic Aperture Radar (SAR) sensors, such as ALOS PALSAR and SAOCOM 1A, permits AGB estimation even in areas with persistent cloud cover, providing valuable insights into the agricultural landscape. LiDAR sensors, including ICESat-2 and GEDI, offer detailed information on the vertical distribution of AGB and can enhance precision in biomass mapping. Future missions, such as NASA's NISAR and ESA's BIOMASS, hold promise for improved SAR and LiDAR data.

Combined sensor optical data and LiDAR provide the most accurate results for AGB data at the plot level. Using only Landsat 8, the RMSE for AGB was 66%, 50% for LiDAR, and 49% for a combination of Landsat 8 and LiDAR. This approach facilitates the establishment of cost-effective monitoring, reporting, and verification (MRV) systems, enabling effective participation in carbon offset programs and enhancing the viability of plot-based carbon projects.

**Keywords:** Remote Sensing, Carbon, Above Ground Biomass,

## **B14. THE THIN LINE BETWEEN SPATIAL KNOWLEDGE AND ENVIRONMENTAL GOVERNANCE: HOW MAPPING VALUABLE ECOLOGICAL LANDSCAPES IN SWEDEN IS PROBLEMATIC**

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Small-scale forest owners manage about half of Sweden's forest area, giving them paramount importance to the conservation of cultural and nature values. Sweden's long tradition of forest ownership and strong rights over management decisions implies that small-scale forest owners' voluntarism is key to the success of any new environmental protection policies. The inclusion of Green Infrastructure across the landscape, to improve habitat connectivity and enhance ecosystem services provision, could be considered a novel form of environmental protection approach that takes into account the existing nature values in the landscape. In order to implement this novel approach the Swedish County Administrative Boards developed Regional Green infrastructure Plans, aimed at gathering knowledge, mapping nature values and listing actions to guide all stakeholders on how to include green infrastructure in their managing decisions. Our study aims to explore how maps and the act of mapping valuable ecological landscapes (i.e. areas with a high amount of key habitats and nature values) was understood from the perspective of the county boards officials coordinating the plans. Our data were gathered through interviews with regional coordinators of majority of the Swedish Counties. In our results, we examine how maps are conceptualized as solely the creation of new knowledge; yet, there was an underlying realization that maps are able to indirectly affect resource distribution for nature conservation or limit forest owners' management. Moreover, we explore how public servants understand and adapt to the problematic nature of maps, generally opposed by forest stakeholders. Finally, a discussion is provided on how maps can be considered spatial knowledge or a sort of policy instrument for environmental governance. Our study underscores how our current information era provides further challenges to small-scale forest owners that need to consider increasingly societal and ecological values in their decision-making.

**Keywords:** Maps, property rights, small-scale forest owners, green infrastructure, biodiversity

## **B15. GAMIFYING FOREST INFORMATION SYSTEMS TO SUPPORT LEARNING AND DATA HANDLING IN FOREST OWNERS' DECISION-MAKING**

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Decision-makers in family-owned forests are increasingly being asked by forestry service providers to adopt online and mobile-enabled forest information systems (FIS) to support their choices. Oftentimes, artificial intelligence (AI) is employed to assess the need for various operations and forest owners then have to decide whether to agree with these AI-generated recommendations or not. While these advances in technology aim to aid problem-solving and help decision-making, they do not necessarily take into account the varied levels of knowledge about forestry concepts that forest owners have. Therefore, decision-makers may have little confidence in using these tools and their uptake and acceptance may be affected. New or inexperienced forest owners may not have a full understanding of what they are being asked to make decisions on and current FIS do not acknowledge this or address the motivation of forest owners to learn about their forests. Gamifying forest owners' information systems could be one option to facilitate this.

Gamification refers to the use of game-like or playful elements in non-game settings. These may be applied to information systems to motivate their users to better understand the data they see, increase engagement with that data, and encourage user enjoyment. We often encounter information systems in our daily life which are gamified to some extent e.g., fitness tracking and language learning applications. These use the most common gamification tools including badges, levels, and leaderboards.

In forestry, service providers can use gamification to support learning and decision-making. For forest owners, this might mean reimagining web-based and mobile forest information services to make them easier to engage with and to support learning. In our presentation, we discuss the possibilities of gamification for forest owners' services and present ongoing research in gamifying forestry education in a forest owners' web service.

**Keywords:** Forest owners; decision support systems; learning; gamification

# Challenges for small-scale forestry

## A16. THE ROLE OF LEGISLATION AND SUPPORT SYSTEM IN THE DEVELOPMENT OF PRIVATE FORESTRY IN LATVIA

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The development of the private forest sector in Latvia is affected by diverse factors since 2020. COVID pandemic, Russia – Ukraine war, intensified requirements of the EU policies related environmental issues have caused significant changes in the wood market and public demand for non-timber forest products and services also in Latvia.

Close to half of total forest area in Latvia belongs to about 120 thousand private forest owners. In the last decade about 6 mill m<sup>3</sup> of timber was provided by private forest sector annually. Despite the fact the volumes are considerable, several studies give evidence that only 40% of PFO had done some forest management activities during 2015-2018. Facts and figures indicate that forest management should be more effective to fit criteria of sustainable forest management under the new conditions and challenges.

Paper analyzes most important determining factors to ensure appropriate forest management in private forest sector - changes in legislation, especially related to environmental issues and climate change; available financial support for forest related activities, extension opportunities and development of cooperation. Studies of various documents, research results and expert interviews form the basis of this study. The information and support available to the forest owners are insufficient to change the forest management behavior of owners' and get them interested in the carbon market in the near future.

**Keywords:** Forest owners, legislation, legislation, cooperative, financial support

## **A17. FRENCH FOREST OWNERS IN TURMOIL. HOW DO THEY DEALS WITH SOCIAL PROTESTS ABOUT CLEARCUTTING**

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Protests and conflicts against clearcutting have increased tenfold in the last ten years in France. NGOs and citizen movements are so active that they are succeeding in suspending and even stopping many harvesting operations in the most productive forest regions. How did this social movement emerge and how are forest owners' associations reacting to this strong social mobilization against clearcutting? Is this a mere artefact, a difficult period to get through, or a transformative moment that is here to stay? Using a socio-constructivist theoretical framework to analyze the rise and fall of social problems, we will show that clearcutting conflicts are not new but often go back several centuries. We will also show how ENGOS and local citizens' movements are joining forces today to put clearcutting regulations on the political agenda through highly effective grassroots and internet communication campaigns. Conflicts are also stimulated by the "greening" and "climatisation" of social debates, which means that every logging action should be evaluated according to its ecological and climatic impacts. Clearcuts illustrate these conflicting views by questioning the impact of forest management operations - whether logging or reforestation - on the landscape, ecosystem services and the ambivalent role of forestry in the economic development of remote rural areas. Despite some moments of violence, we show that these conflicts can be a positive moment to discuss the social contract between citizens, forest owners' organizations and forest policy makers. Finally, we will show how these conflicts lead some forest owners to reconsider certain forestry techniques such as clearcutting and policy makers to adapt forestry regulations concerning clearcutting at the margin.

**Keywords:** Clearcutting, forest conflict, social mobilization, forest regulations, forest policy

## **A18. CHALLENGES IN LAND RETENTION IN THE SOUTHEASTERN UNITED STATES THROUGH CO-TENANCY LAND OWNERSHIP**

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In the United States the majority of forestry land is in private family land holdings, this is particularly true east of the Mississippi river. Many local and regional economies are dependent on these small family owned forests which average 29 acres in size to supply them with the needed raw materials to produce a wide array of forest products. Fragmentation of these lands through development, and a legal process known as partitioning, continue to remove forest properties from the forest inventory. Partitioning is an avoidable process and most frequently occurs on property known as “heirs” property where co-tenancy has created the most vulnerable form of land ownership within the United States legal system. Minority communities and in particular African American landowners are disproportionately heirs property owners which adds a layer of complexity, and has implications relating to environmental justice issues. A great deal of effort is going into prevention, education and remediation relating to heirs’ property. This talk will clearly articulate with data, the scope of the problem, and the legal and legislative remedies. In general this talk will also highlight the importance for succession planning for private land holdings to ensure that valued forested lands remain productive and in forestry uses.

**Keywords:** Small forests, Heirs Property, Succession Planning

## A19. THE REPRESENTATION OF FOREST OWNERS IN COLLABORATIVE GOVERNANCE PLATFORMS: THE CASE OF THE FAILURE OF ESTONIAN NATIONAL FOREST PROGRAMME

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Managing contradictory expectations towards forest policy is a complicated governance task. By 2016, the tensions around Estonian forest policy had increased to such a level that the situation was called “Forest War” in the media.

The process of preparing the Estonian Forestry Development Plan until 2030 was initiated in March 2018 and according to the timetable, the plan had to be submitted to the Estonian Parliament in spring 2020. The preparation of a central periodic policy document was planned as a collaborative governance platform, with a lead committee of 35 members (including 7 scientists) from 31 different organizations (ministries, universities, stakeholders’ NGOs). As an innovative solution, professional moderators were hired to ensure constructive discussion. However, the policy discussion process failed badly after exceeding all deadlines. The new Minister of Environment dismissed the lead committee on December, 2020, and started to seek possibilities for relaunching the process. The new lead committee was formed at the end of March 2020. It consisted of 7 scientists, who were not members of the previous committee, and 2 officials. As of spring 2023, the national forestry program has not yet been approved, it now waits for discussions by politicians, the members of parliament. We present an analysis of the design and process of this collaboration attempt that highlight the factors that helped and hindered the achievement of an agreement in the platform. Our analysis is based on collaborative governance theory (Ansell & Gash, 2008) and in-depth interviews (N=34) of the first lead committee members and analysis of documents. The results contribute to the theory of collaborative governance by differentiating between moderation and mediation and offer practical lessons for similar collaborations in the future.

**Keywords:** Forest governance, policy processes, stakeholder analysis, national forest programme

## Posters

### P1. LAND USE EVOLUTION AND THE IMPACTS OF FORESTRY INTERVENTION ZONES IN PORTUGAL

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The Forestry Intervention Zones policy (ZIF), introduced in 2005, has as its objective to facilitate the management of forests in regions with highly fragmented land in Portugal. In 2022 there are already 267 ZIFs created throughout Portugal, corresponding to more than 1.9 million hectares. Using available data from the National Institute of nature and forestry conservation (ICNF), this paper will analyse the land use evolution of the ZIFs, as well as their ability to prevent forest fires, comparing to national trends, allowing the analysis of the practical impacts of this legislation between 2005 and 2015. Moreover, in order to assess how this policy influenced such developments, a case study will be carried out in selected regions, analysing what are the motivations, and perceptions of the participants in these zones, as well as possible leverage points that may, in the future, help to improve the efficiency of the policies applied to the ZIFs.

**Keywords:** Policy analysis, Small scale forestry management, land fragmentation, Portugal

## **P2. SERVICES FOR WHAT AND FOR WHOM? A LITERATURE REVIEW OF PRIVATE FOREST OWNERS' DECISION-MAKING IN RELATION TO FOREST-BASED SERVICES**

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The more distanced forest owners become from their forests, the more room there is for different kinds of advice and service provision to help them in their forest management decisions. Therefore, the quality and adaptation of these services impact the use of forest resources significantly, including at a broader scale. Even though the forest owners' decision-making at the general level, as well as the role of advisory services and their efficiency has been the subject of various studies, literature on how forest owners make decisions in relation to the various types of service provisions appears to be limited, and no systematic review has been found.

To offer a better understanding of the present state of knowledge on, and the relations between, decision-making, forest related services, and forest ownership, this literature review provides an overview of the scientific research between 2008 and 2020 on private forest owners' decision-making related to services. The results show that the forest owners' decision-making related to services has been gaining increasing interest as a research topic, especially during the last 5-6 years. However, it is still dominated by a few countries and contexts. In addition, in the current research decision-making concept is mostly understood as a decision outcome i.e., the forest owners' choice between typically two alternatives. The importance of process-based understanding on decision-making, on the other hand, seemed to be largely missing from the forest owner studies. As conclusions, five proposals for future research avenues are presented.

**Keywords:** Private forest owners, woodland owners, decision-making, service, extension, literature review

### **P3. TRANSITION TO SELECTION CUTTING MANAGEMENT IN MATURE STANDS IN ESTONIA: EFFECT ON STAND PRODUCTION AND DEVELOPMENT**

*Marek Uri<sup>1\*</sup>, Kristiina Aun<sup>1</sup>, Mai Kukumägi<sup>1,2</sup>, Mats Varik<sup>1</sup>, Hardo Becker<sup>1</sup>, Jürgen Aosaar<sup>1</sup>, Agnes Sepaste<sup>1</sup>, Mikko Buht<sup>1</sup>, Allar Padari<sup>1</sup>, Veiko Uri<sup>1</sup>*

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In the more forested areas such as Nordic and Baltic regions and also Northern America continuous cover forestry (CCF) through selection cutting (SC) is considered an alternative perspective management method of clear-cutting. In connection with this, the need for relevant knowledge of different aspects related to SC management, including the post-harvest dynamics of the growing stock and the productivity of stands, has increased. We aimed to compare the dynamics of the growing stock of stands after clear-cut (CC) and after SC during the two nearest post-cutting decades. The relative share of high-quality timber assortments, e.g. saw logs, was larger from CC than from initial SC; consequently, the share of low-quality wood was larger from SC, since low-quality or damaged trees were removed during initial SC, for improving further stand quality and stability. Because of old age and a reduced basal area due to removal, the amount of harvested timber exceeds the annual increment of stemwood during the period between repeated cuttings. Although SC enables sustaining old forests in the landscape for a longer period, the productivity of such thinned old stands can be low for effective forest management.

Post-harvesting stand volume dynamics showed contrary patterns for stands managed by SC and CC during the period of the nearest two decades. The growing stock of SC stands declined gradually due to the low annual stemwood increment and repeated removals. Young pine stands, which started developing after CC showed a typical pattern of forest development, with increased stand volume and productivity. This study highlights the fact that the transition to SC management at the mature stages is too late for reshaping pine or pine-spruce mixed stands for continuous cover forestry.

**Keywords:** Selection cutting; continuous cover forestry, Scots pine, modelling growth dynamics

## Accepted abstracts whose authors could not participate for various reasons

### **BAMBOOS FOR FUTURE: SYSTEMATIC REVIEW ON ECOSYSTEM SERVICES AND CLIMATE RESILIENCE**

Vaisakhy Prem Chand\*,*Error! Bookmark not defined.* Annie Biju  
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Bamboo has been recognized as a potential resource for socioeconomic development because of its rapid growth, perceived environmental benefits, promising material features, many applications, and relative poor infrastructure as an international essential commodity. The lives and livelihoods of millions of underprivileged people around the world depend on bamboos. Although it will impact all of us, the poorest will be most impacted by climate change. The objective of the present paper is to carry out a systematic review on ecosystem services provided by bamboos with particular emphasis on climate resilience in South-East Asian Countries. We carry out a SWOT analysis based on case studies and offer recommendations on how to more effectively harness bamboo's potential for a climate resilient green economy and society. We evaluate the impact of climate change in vulnerable communities and understand the affect of bamboo towards climate resilience in such communities. We aim to identify the research gaps, critical factors that delimit the use of bamboos, and propose strategies to improve ecosystem services provided by bamboos for economic, social and environmental development of the community.

**Keywords:** Bamboo, Ecosystem Services, Climate Resilience, Social Development

## **SUSTAINABLE DEVELOPMENT IN THE FOREST-DEPENDENT COMMUNITIES: ROLE, LIVELIHOODS, AND CULTURAL-SPIRITUAL VALUES**

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Our aim is to assess and analysis the key role played by forests on sustainable development of communities that depend on them. The subject is complex because it involves social, economic, political, and environmental aspects, being essential that there is adequate coordination between all administrations and/or organizations interested. Also, between all stakeholders implicated in the rural sustainable development. The human population is growing excessively fast, so that it will require livelihoods maybe two or three times higher than it does today. A livelihood not only includes people, but also their abilities, including all income, food, and other resources. From our point of view, we consider that a livelihood is sustainable when at least maintains the resources of which depends on and at the same time can also provide them for the future generations. The appreciation of the multifunctional nature of forests –multiple use– promotes the creation of markets for forest products other than wood, small-scale products and ecosystem services, which could generate enough capital to finance forest management linked to rural development. Policymakers, private forest ownership and the individual's capacity to identify the opportunities are essential factors in the making of growth possibilities for rural areas. Feedback from all experts suggest a need for training programs, aiming to present opportunities offered by the forestry sector for rural development. Finally, on one hand, most recent assessments of forest ecosystems prioritize the economic values including freshwater, carbon storage, production of foods and building materials, medicines, gas exchange, productivity from sunlight, soil conservation, shade, and biodiversity habitat. And, on the other hand, most ecosystem services assessments ignore the spiritual value of forests, which is harder to measure with economic metrics. The forest cultural-spiritual value is not only critical in scope but also imply to have a greatest potential for conservation actions.

**Keywords:** Forest owners', livelihoods, multifunctional forest use, policymaker

## LOCAL DEVELOPMENT IN THE INNER-RURAL AREAS OF THE NORTHWEST IBERIAN: ROLE AND OPPORTUNITIES OF FOREST COMMONS

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The Northwestern Iberian, constituted by north Portugal and Galicia, is a peripheral region of both European Union and the Iberian Peninsula itself. It has almost identical geographical, historical, socioeconomic, and cultural characteristics, as well as a similar language. There are discrepancies in demography and productive structures, and structural problems are comparable, however contrasts tend to disappear in the inner-rural areas. On the one hand, demographic desertification, increase of the unproductive areas, wildfires, and lack of forest management knowledge by most of the forest owners. On another hand, scarce income generated by forestry production, and low employment level, new growing demands by the urban society, and uncertain future perspectives. Both Galician and Portuguese forest commons show similarities and complementary benefits needing a social and economic innovation to make better use of rural resilience. The commons and small-scale family enterprises could support the local produce market, i.e., natural recourses, as well as contribute to improve ecosystem services, mainly biodiversity conservation. There are also plenty opportunities based on the sustainable use of natural resources, for example, improved silvicultural, hunting, taking advantage of non-timber forest products, tourism and recreational use..., being itself as an alternative to urban areas. The resources and dimensions, and the untransmissible character of the property turn them important areas for a suitable rural development. The effectiveness of development strategies needs a tool joining evaluation rigor with the kindness of social values, often diverse, undefined, or divergent. The objectives of our work are to (1) research different tools combining quantitative and qualitative procedures to analyze the contribution of commons to sustainable development and (2) promote its identification, using the knowledge and wisdom of the stakeholders, and different rural development criteria and indicators that must be monitored to apply essential strategies.

**Keywords:** Resilience, forest owners, ecosystem services, natural resources

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