Conference on Life-Long Learning for sustainable forestry Estonia-Latvia 15-16 June 2025

Book of Abstracts

Editors: Erika Olofsson, Rikard Jakobsson, Dagnija Lazdiņa

Linnæus University

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Erika Olofsson, Rikard Jakobsson, Dagnija Lazdiņa
(editors)

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Introduction

Importance of forests and owners in the Baltic Sea region
The Baltic Sea is surrounded by countries with forests providing ecosystem services like wood, clean air and biodiversity (Winkel et al. 2022) important in fulfilling national, EU and UN environmental goals (Baumgartner 2019). A large extent of this forest (in EU 60%) are owned and managed by private forest owners and situated in the countryside (Eurostat 2020).

As a forest owner you decide on how to manage the forest and are responsible for actions taken on your land including harvest, cultural heritage, habitats, game population, recreational values, and taxation. In fact, with great values found in their land (Tiebel et al. 2022) private forest owners are detrimental for supporting and implementing sustainable forest management, EU policies and enabling rural development (Elands and Wiersum 2001), and in a countryside with rather grim career opportunities, forestry is one of few sectors where these exist.

Lacking higher education – but seeds are growing
Despite the complex issues of social, ecological and economic matters, academic education for forest owners has been absent. In contrast, the State in most countries has academic curricula, for the needs of the State. Certainly, vocational education and training has been existing and well developed in most countries, both for forest owners and professionals. However, the possibility to gain the equivalent knowledge as forest owner has been lacking, until in 2001, when academic forest owner education started in Sweden at Linnaeus University (then Växjö University) (Jakobsson and Olofsson 2024). With a blended learning set-up, a life-long learning was enabled.

In 2022, in cooperation with the Latvian State Forest Research Institute "Silava", Latvian University of Life Sciences and Latvian Forest Owner Association, an international trial was set up in Latvia to create the course International Sustainable Small-scale Forestry. The Estonian University of Life Sciences, The Estonian Private Forest Owner Association, Latvian rural and Training Centre and Vytautas Magnus University have also been aidees as well as IKEA, Södra and SCA. The Swedish Institute financed the seed and subsequent collaboration projects.

Building on the cooperation with Swedish-Baltic partner organisations and existing national experiences of forest owner education, the concept to develop academic forest management courses for forest owners and

professionals is now being extended to Ukraine through Kiev School of Economics.

With increased academic qualifications, forest competence levels and productivity can increase in terms of human, economic, biological and cultural values.

In the process, a mutual exchange is also taking place, where know-how in the Baltic countries concerning especially the tending of broad-leaved forests and small- and medium sized machinery is used throughout the value chain. This is of interest to many large and small forest owners for example in Sweden, where tending is focused on pine and spruce with large machinery.

The need of an life-long academic education for forest owners is high in the EU and considering the social, economic and biological values at stake should be prioritised in national development and budget allocation. Future needs of forest owner education is also increasing.

Life-long learning in forestry

Any forest education must be adapted to target groups and countries. In the Baltic region, conditions are, with some exceptions, similar or overlapping; when planning for a forest owner education in one country, many can benefit. There is however always a need to adjust a curriculum to country-specific conditions.

Apart from content, the form of education is important. Forest onwership tend to begin at about 50 years of age. In order to fit an education to the life situation, flexible/blended learning is important which also emphasize the possibility to life-long learning. This includes field sessions, home work, Zoom/Teams-meetings and examinations. As experienced in numerous courses, the physical meeting and subseguent networking are essential and highly valued student activites. Distance-based approaches also favours gender balance in the student group (Jakobsson and Olofsson 2024).

A small-scale foresty network

Based on the mutually developed educational flexible learning infrastructure in Latvia and Sweden and the partner countries Estonia, Lithuania and Ukraine, a well-founded base can be used to take the established courses one step further and with that a reach-out to a greater share of forest owners. Including Ukraine is an effort to give preparations for developing education and career opportunities in a flexible learning

environment during and after the current conditions due to the Russian invasion.

With this book of abstracts we would like to, for academic forest owner and professional life-long education in the Nordic-Baltic region conclude the Swedish Institute financed project, thank Seydlitz MP-bolagen for financing travels and accommodation to the conference, thank all partners for fruitful collaboration and:

- Give a state of the art of life-long learning in the forest including
    - Courses and their learning effect
- Exchange practical experiences on life-long learning about the forest
- Give a future look-out
- Conclude the project, and
- Establish a network for forest owner and professional life-long education.

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6 June 2025

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Science (mis)communication regarding forest productivity trends in Sweden spurs governmental calls for inappropriate forest management actions

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Understanding whether tree growth has accelerated, stabilised, or declined in recent decades is pivotal for guiding forest management and predicting ecosystem responses to climate change. We used dendrochronological data from the Swedish National Forest Inventory (1935–2022) to evaluate growth trends in >155,000 trees, representing over 20 species and totalling over 6.5 million annual growth records to: (i) quantify long-term growth trajectories, (ii) identify cyclical patterns, and (iii) assess drivers of a post-2014 decline in forest productivity. The results revealed pronounced interspecific variation; six of the ten most abundantly sampled species showing positive long-term linear growth trends (ranging from 54.8 to 908.6 mm^2 $year^{-1}$) and displayed cyclical fluctuations of 3.3–10 years in duration. Asynchronous growth may stabilise stand-level productivity via insurance and portfolio effects, by buffering against fluctuating environments. Contrary to reports of a nationwide decline in forest productivity of ~14% since 2014, we found no significant reduction in tree growth; both oak and black alder instead grew faster during this period. Our analyses also indicated a decrease in average tree age, and notable declines in mean stem diameter for several species, including Norway spruce and Scots pine, coinciding with increased final felling. The results highlight the distinction between tree-level growth and nation-wide forest productivity, the latter being particularly sensitive to modified management practices, harvesting regimes, and climate-related disturbances. Reversing contemporary productivity declines may hinge more on shifts towards mixed-species stands and modified felling practices and rotation times, rather than fertilisation or other measures aimed at enhancing per-tree growth.

Teacher-student co-development of assignments in forest ecosystem services

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Incorporating student participation in teaching activities is an effective strategy to enhance their motivation and develop their skills in problem-solving and research methodology. The objective of this task is to engage master's students, foster their enthusiasm for the assignment, and train them in problem-solving and method development. The process and methodology of ecosystem analysis, typically applied to regional areas, were adapted for forest stands using techniques originally developed for analyzing ecosystem services in urban environments. The ecosystem services selected by the Forestry Commission were utilized in this analysis. Students applied the method to sites of their choosing and conducted an ecosystem service analysis on these locations. The reports were evaluated using a grading matrix provided to the students beforehand. During the students' report writing individual supervision was employed and most students verbally expressed spontaneous enthusiasm for the assignment. Many had incorporated material into the report that was not presented during the course like focus interview with persons living in the area, modelling of the forest growth, modelling of urban ecosystem services and using soil maps. A survey was conducted to gather students' feedback on the assignment, assess whether it increased their motivation, and determine if they felt more confident in developing assessment methods in the future. The results will be presented. Both the students who contributed to the method's development and those who were passive performed well on their assignments.

Keywords: Student driven teaching, inclusive teaching, assignment co-development

Reasons for quitting a blended learning forest owner course

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Linnaeus University

The blended learning courses in Small-scale forestry have been running at Linnaeus University since 2001 with more than 5000 attendees since the start. The set-up has typically started with a forest excursion followed by home-work and after a month next excursion. In the end has been a written examination. The content has slightly changed over the years, constantly with the basic ambition to introduce forest owners and interested to forest management through forest ecology, forest mensuration, silviculture, forest growth and yield, forest economy and timber trade and measurement. Despite a long period of studies and course evaluations, and many students that quit, their reasons for doing so is unknown. This gap of knowledge and feed-back was thus urgent to fill. We sent a questionnaire to 315 students in three courses of 15 and 2*7.5 ECTS on 50 and 25% study rate without study records in the semesters of spring and autumn 2022 and 2023 asking them why they quit (max five reasons and additional text) and to rate importance in factors of expectations, economy, work, educational, study group and home relations. Answers were analysed quantitatively based on rankings in the questionnaire with analyses of variance with non-parametric test for differences between means and qualitatively with semantic content analysis in External, Internal and Study factors. The 25 respondents ranked work as the most important factor for quitting, followed by expectations on the set up and the educational set-up. The semantic analysis showed that of external factors, Work and Time were the most important. For internal factors, it was Relations and Balance in life and for study factors it was Distance to physical meeting, Occurrence of physical meetings and Scheduling. Applicants' reasons for quitting to the largest extent depend on the external factors Work and Time. More information on what to expect from the course set-up when applying would be helpful for students in order not to underestimate their possibility to fulfilment.

Keywords: Life-long learning, forestry, small-scale, forest owner, learning effect

Student background and fulfilment in academic forest owner courses

Rikard Jakobsson, Martin Karlsson
Linnaeus University

In higher education, student achievement benefits the individual student with better prospect of further studies and work opportunities and the universities with better reputation and financial compensation. Achievement is measured as the proportions of students completing a course (fulfilment), or as throughput, where partially completed parts are included. At Linnaeus University, general entry requirement courses for forest owners and interested have been provided since 2001 with a blended learning approach, and over 5000 participants. In the student group, (aged 40 in 2024) many work, study or are retired and are part of the EU Education Area where life-long learning is a goal for a competitive work force. Though followed up in general terms, no data has been analysed on the group concerning fulfilment factors, hence there is a need to draw conclusions on those learning aspects. The purpose of this study was to investigate the effect of student background in terms of upper secondary school programs, age and gender on throughput. Student data was sought out in Ladok, the Swedish national system for student reporting. Demographics contained age, gender, upper secondary profile and merits. The data was combined with academic fulfilment and throughput for the years 2001-2023 per course occasion and code. On average, there was no statistically significant difference in throughput between gender ($p=0.2562$, $n=8\ 346$). In age groups (by course year), the 60+ group had a higher throughout than the younger groups ($p=<0.0001$, $n=8\ 346$). Throughput varied from 32 to 91% between courses and the 164 course occasions made 13366 comparisons of which there was a statistically significant difference between 419, representing 3.1% of the total ($p=<0.0001$, $n=8\ 346$). Course occasions nested within course showed a similar pattern ($p=<0.0001$, $n=8\ 346$). The course extent showed a higher throughout for 15 ECTS credit courses, than 7.5, 22.5 and 30 ($p=<0.0001$, $n=8\ 346$). Finally, though big differences in throughput between upper secondary school background, there was no significant differences difference between them. In conclusion, no matter background (schooling, gender, study rate) older students seem to do well in higher forest education with good prospects for advancing in life-long learning. Keywords: Student fulfilment, student achievement, student throughput, student fulfilment

What is the effect of education in vocational training in Södra forest owner association?

Rikard Jakobsson, Erika Olofsson
Linnaeus University

In the EU, Vocational Education and Training (VET) exist in many formats supplied by employers, trade unions, and councils, and is part of the European Education Area. In southern Sweden, one provider of VET within forestry is Södra, a cooperative membership association for 52 000 forest owners and an industrial owner of saw and pulpmills. Six courses are currently available for Södra's members and since 2013 almost 3 600 forest owners have fulfilled the introductory course. The course evaluations are generally positive, yet there is a lack of knowledge about what effect the courses have on forest owners' learning. The purpose of this study was therefore to follow up the effect of Södra's VET-course on participants' learning, specifically the effect on knowledge and attitudes. We sent questionnaires on attitude and knowledge level before and after the course occasions in autumn 2023 to 122 participants of which 34 answered both before and after the courses. Attitude comprised quantitative appreciation on 15 variables related to forest management on a Likert scale, graded 1 to 4, where 1 was the least and 4 the highest. Questions on self-estimated knowledge, overlapped with attitude variables with four additional open-ended questions of respondents' factual knowledge in forest management. For attitude, Good relations (neighbours, buyers) was most highly valued followed by Good nature consideration, Recreation and High nature values. The largest positive difference occurred for Cuttings, Wildlife and Outdoor activities. For self-estimated knowledge, Recreation, Wildlife and Outdoor activities were most highly valuated both before and after with the largest positive difference for Certified forestry, Good nature consideration and Cuttings. For factual knowledge, the answers to the open-ended questions resulted in 45% more text after the course than before ($p=0.03$) differing for the questions on the Forestry Act, Soil preparation, Pre-commercial thinning, but not for Nature consideration. The knowledge questions generated on average 69 points before the course, and after 115 points, with the largest increase in points for the Forestry Act. The courses had a clear impact on 2/3 of attitude factors and all knowledge factors, providing an important knowledge path to forest owners.

Keywords: Vocational education, forestry, small-scale, forest owner, learning effect

Effect of academic education on forest owners' learning and management

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Linnaeus University

An underlying motive for education is that it produces an impact. However, this impact is rarely evaluated and quantified, and knowledge beyond the course evaluation is often lacking, not least in forestry. Since 2001, Linnaeus University in Sweden has conducted academic courses for forest owners and other interested. Over 5500 people have attended the course "Sustainable Small-Scale Forestry", designed for blended learning, with physical meetings in the forest combined with independent studies and written assignments. The effect of these courses on forest owners' learning and implications for forest management has never been studied, despite the significant role private forest owners play in managing large areas of forest and achieving policy goals on national and EU levels. We therefore investigated the effect of the courses on forest owners' learning (attitudes, self-estimated and factual knowledge), behaviour (implications for forest management), and relations, with students beginning their studies between 2005- 2023. Data were collected through pre- and post-course questionnaires and individual in-depth interviews. A clear majority of respondents found the courses to be quite or very positive. The courses had a small effect on the forest owners' attitudes, while the effects on their self-assessed knowledge were much greater. The highest stated effect on respondents' knowledge was in forest growth and yield, profitability, nature conservation, cuttings, and high nature values. The factual questions confirmed the increase in knowledge, particularly regarding the Forestry Act. The highest stated effect of the courses on respondents' behavior was in their relations with buyers, forest growth and yield, nature conservation, profitability, and high nature values. Some forestry measures included PCT considerations promoting broad-leaved tree species and wildlife, plant type/size/species, and use of bio-based repellents, marking cultural heritages, conducting tax declarations, and creating wildlife ponds. The major impact was the ability to make own judgments and decisions based on a broader understanding of forest values. The interaction with buyers was more on a level of discussion rather than simply accepting suggestions. The effect of the courses included the forest, its owner and interaction with the value chain, providing an important part of the triple helix model for innovation.

Forest and wood education in Sweden: Do current forest educations fulfil societal needs?

Jimmy Johansson, Rikard Jakobsson
Linnaeus University

A basic understanding of forestry and wood industry educations currently available in the Baltic region is one step in order to analyse the provision of educations to the labour market and the matching of the needs for the market. When comparing the competence provision from educators to society, the education systems in European countries show some basic similarities They tend to build on mandatory school followed by either practically oriented vocational schooling, or theoretically oriented, such as upper secondary school preparatory for higher education. However, within this frame, there are many variants with possibilities to crossing the education paths and other differences that might depend on the societal needs of countries and historical reasons. Using open media from Swedish and EU sources primary and secondary educations were mapped plus an overview of other education providers. In addition, small-scale forest CEOs, forest owner association employees, industry representatives, civil servants and NGOS were asked what immediate and coming competence needs they see. The proportion of people with continued studies at least three years after upper secondary school has increased from 16% in 2000 to 31% today. In total there are about 750 upper secondary school units in Sweden with some 18 providing vocational training in forestry, for wood technology there are 2 and few production-oriented programs with focus area wood. Additionally there is Yrkeshögskola, which is a close to industry created education. In higher education Sweden has academic forest owner education with general entry requirements at Linnaeus University (5500 attendees until now). There are bachelor and master programs, and an engineering program. There are similar programs at SLU, but so far with decreasing trend of applying students. Sweden had through forest owners associations a big private source of vocational education and additional state and semiprivate providers also offer courses. Immediate and coming competence needs concerned harvester drivers, skills to calculate timber purchase, knowledge on climate change adapted forestry, EU policies, operation planning, digital competence and problem solving capacity.

Keywords: Life-long learning, forestry, societal needs, labour market demand, competences

Do student presentations reveal which students finish a course?

Martin Karlsson, Rikard Jakobsson
Linnaeus University

In Swedish higher education, distance based courses often has a lower degree of throughput (52%) as compared to campus courses (62%). Since academic achievement is important for both students and universities, factors to increase throughout are important to examine. This is further stressed by EU policies to strengthen a competitive workforce and life-long learning. The course Small-scale forestry courses at Linnaeus University are on basic level with general entry requirements on study pace of 25 and 50% and have been running since 2001 with over 5000 students. These are typically aged around 40, working och retirees, forest owners or soon to be and 50% women. Our purpose was to investigate if student presentations (content, extent) relates to throughput. We thus examined how the amount of text in presentations in the course Sustainable Small-scale Forestry related to grades and fulfillment. On average, students with pass and higher course grades (50% of registered) had the same quantity of words and letters no matter the grade, whereas student without a course grade (30% of registered) had only 70% of words and letters. Students with no results on the course (about 20% of registered) had only 40% of words as compared to those who passed. 10-25% of students wrote no presentations yet finished the course. Student age affected the number words markedly, the older quarter wrote 3 times as many words as the youngest quarter of students, and men 15% more than women. The extent of student presentations could act as an indication of student commitment, especially for those with short wording, aiding teachers in where to put extra effort to promote student participation.

Do compulsory or optional student tasks and extent of task affect fulfilment?

Martin Karlsson, Rikard Jakobsson
Linnaeus University

In Swedish higher education, distance-based courses often has a lower degree of throughput (52%) as compared to campus courses (62%). Since academic achievement is important for both students and universities, factors to increase throughout are important to examine. This is further stressed by EU policies to strengthen a competitive workforce and life-long learning. The course Small-scale forestry courses at Linnaeus University are on basic level with general entry requirements on study pace of 25 and 50% and have been running since 2001 with over 5000 students. These are typically aged around 40, working och retirees, forest owners or soon to be and 50% women. Our purpose was to investigate if fewer compulsory student tasks affected the student fulfilment in courses of Small-scale forestry. We therefore tried two course set-ups, one per course in two courses that started the same semester. The differences were 1), whether three quizzes were compulsory or optional and 2), the number of plant species a student needed to describe and document to pass a home assignment. We then compared the courses for the number of students that fulfilled the different course modules and the whole course. We found that there was a difference of 15 percentage units between courses but the causality of compulsory or optional quizzes could not be related to that.
Similarly, the number of plant species in the task did not affect the throughput. Our conclusions are that having compulsory or optional tasks did not affect throughput or the students` achievements; differences are more likely due to other factors.

Digital Canopy: Cultivating Lifelong Learning Communities in Baltic Forestry Education

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Linnaeus University

Digital competence is reshaping forestry education, advancing the concept of digital forestry (Bugmann et al., 2023; Damaševičius et al., 2024). This study examines the International Sustainable Small-scale Forestry I course, which blended online learning with field-based excursions to foster a collaborative learning community among Latvian forest owners and professionals. Grounded in situated learning theory and communities of practice (Wenger, 1998), the course integrated digital instruction with hands-on applications. The pilot phase revealed key challenges: varying digital literacy, inconsistent engagement, and technical issues with the learning platform. Building on these insights, the main course phase targeted improvements included streamlining the LMS interface, structured Zoom onboarding, and expanded ICT support, leading to greater usability and participation (Bugmann et al., 2023). Findings highlight that blended learning bridges formal education and forestry practice, reinforcing competencies in biometric measurement, silviculture, and sustainable harvest planning (Damaševičius et al., 2024). The model also benefited educators by enhancing feedback mechanisms and extending instructional support (Bugmann et al., 2023). This study underscores the value of blended learning in professional forestry education, particularly in regions facing changing land ownership and climate adaptation challenges (Wenger, 1998). Future research should explore adaptive learning, multilingual support, and AI-driven personalization to enhance accessibility and engagement (Damaševičius et al., 2024).

Keywords: Digital forestry, blended learning, professional development, forestry education, communities of practice

Effect of academic forest education on course participants of an independent course in Latvia

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LSFRI Silava[1], Latvia University of Life Sciences and Technologies[2], Linnaeus University[3], Latvian Forest Owner Association[4]

The effect of academic forest education on behaviour is rarely investigated but important in order to understand education's role and potential for individual and societal goals. Linnaeus University in Sweden has in collaboration with Latvian partners Latvian State Forest Research Institute Silava (LSFRI Silava), Latvian University of Life Sciences and Technology and Latvian Forest Owner Association conducted academic courses for forest owners and other interested. Over 40 participants have attended the blended learning course "International Sustainable Small-Scale Forestry", with physical meetings in the forest combined with independent studies and written assignments. The effect of these courses on participants' learning and implications for forest management has not been studied, despite the potential impact of forest managers in achieving national and EU policy goals. We therefore investigated the effect of the courses on participants learning (attitudes, self-estimated and factual knowledge), behaviour (implications for forest management), relations, and teacher's experienced change in student knowledge level with students 2023-2024. Data were collected through pre- and post-course questionnaires with answers on 1-4 Likert scale and subject questions. The courses had no effect on the forest owners' attitudes, while the effect on their self-assessed knowledge was larger. The highest stated effect on respondents' knowledge after relative to before was on Continuous cover forestry, High economical yield and High Environmental values. The factual questions confirmed the increase in knowledge, particularly regarding the Forestry Act which was doubled in text response. Teachers' view on student progress was increased knowledge levels particularly in Ecological principles, Forest mensuration, Mechanization and for generic abilities Mutual cooperation, Networking, Problem solving and Knowledge exchange. Academic courses for forest owners and professionals serve multiple purposes in that increased knowledge leads to more well-founded decisions beneficial for owners, forestry and society.
Keywords: Life-long learning, forestry, societal needs, labour market demand, competences

Virtual catchments, real learning: Developing a roleplay game to study forest and water management

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Game-based learning has been found to improve soft skills, such as teamwork, critical thinking and problem solving. Serious games, designed with a primary purpose beyond entertainment, are increasingly used in environmental education as a tool to inform and educate the players. This presentation gives an oveview of a serious roleplay game developed for the course "Forest management and environment interactions" taught to 1st year master students in the Forest science program at LULST, as well as the role of student feedback in refining and improving the initial version of the game. The aim of the game was to explore different options and perspectives of various stakeholder groups in watershed management and to facilitate discussion and critical thinking skills. The test run of the game took place in March 2025. The game "area" was a fictional watershed with given biophysical and socio-demographic characteristics. The first task was to develop and present a 5 000 000 EUR-worth environmental project in four areas - close-to-nature forestry, sustainably intensified forestry, agroforestry and riparian zone management, and tourism and recreation. After that, the initial four groups were split and mixed. Each group was then randomly assigned a stakeholder role (state forest manager, private forest manager, environmental NGO, farmers' association, tourism association, municipality etc.) and asked to prepare arguments for approval of one project from its perspektive. Then, discussion and voting took place. After the game the students were asked to provide immediate verbal feedbeck and subsequent written feedback on the explored topics, roleplay aspects and design of the game. The overall response to the game was positive, with highlighted value of providing a space for discussion and exploring alternative viewpoints. Students also provided practical suggestions for improving the game in the future. Generally, this was a valuable learning experience both for the class and the teacher, with good potential of further development and incorporation in the study course.

Keywords: Serious games, environmental education, student groupwork, soft skills development, collaborative learning

Long-life education joint workshop results for analysis of scenarios for scaling up socioeconomic benefits in Forests 4LV research program

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Interdisciplinary joint workshops conducted within the Forests 4LV research program, aimed at fostering life-long education helps in evaluating scenarios for scaling up the socioeconomic benefits of sustainable forest management. A central focus is the development of a dynamic Scenario Modelling System (SMS), grounded in empirical research and designed to simulate long-term forest sector trajectories under changing climatic and policy conditions. To reinforce scientific rigor and contextual relevance, the workshops organized in cooperation with NGO engaged a broad spectrum of stakeholders. Their active participation was essential in co-developing plausible forest management scenarios, particularly those involving afforestation—highlighted in revised national climate policies. Special attention was directed toward reconciling discrepancies in the definition and application of key performance indicators (KPIs) across operational scales, from enterprise-level reporting to national policy assessment. The socioeconomic viability of modeled scenarios was quantified through the SMS, considering trade-offs in wood assortment structures and harvested wood product categories. These assessments going to support long-term projections on the impacts of commercial forest use restrictions, especially in pine-dominated stands. Outcomes are disseminated through scientific conferences and integrated into life-long learning curricula, ensuring the continuity and scalability of the program's innovations. This participatory and scientifically grounded approach demonstrates a model for bridging research, policy, and practice—strengthening the adaptive capacity and socioeconomic sustainability of forest landscapes in Latvia and beyond.

Keywords: Sustainable Forest Management, Scenario Modelling, Socioeconomic Impact, Assessment; Stakeholder Engagement

The role of commodity exchange trade in life-long learning for forestry: case of Ukraine

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This paper examines the evolution of organized timber trade on commodity exchanges in Ukraine and how this development affects the long-life learning in forestry. Over the period of independence, Ukrainian timber marker was largely associated with non-sustainable forest management, shadow logging and timber selling, inefficient timber processing. The study reveals that the launch of electronic timber trading in 2019 and the development of licensed exchange trading from 2021 stimulated the growth of timber market transparency due to two factors. First, the integration of the data of commodity exchanges with the Unified state system of electronic accounting of wood increased the control over the market at all stages of sale of wood materials. Second, the increase in sales prices reduced the economic feasibility of the existence of the shadow wood market. The rapid development of organized timber market sets new goals and challenges related to proffecional learning in forestry. The analysis is based on desk research and in-depth qualitative interviews with the main stakeholders: State Enterprise «Forests of Ukraine», State Agency of Forest Resources of Ukraine, organized commodity exchanges, and other. The results revealed several directions of professional education related to organized timber trade. First, a developed network of regional stock exchange agents allows for inspections of the physical process of wood supply under stock exchange contracts. This means that the procedures of logging and selling timber became more standardized and require specific knowledge on forest management, logistics, quality inspection, and contract execution. Second, the integration of exchange trade with other electronic services and registries necessitates the improvement of digital skills of all forest market participants. Third, market transparency stimulated the demand on price risk management instruments, which should be integrated in the financial planning process of forest enterprises and timber processors. The study concludes that, on the one hand, the evolution of organized timber trade exchange shapes the learning program for timber market participants. On the other hand, lack of specialized knowledge and skills in forestry could be a critical bottleneck for the development of commodity exchange trade in Ukraine.

Keywords: Ukraine, commodity exchange, forestry education

Forestry Sector in Ukraine and Sweden: Comparative Analysis of Education, Policy, and Market Developments

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This paper explores key developments in Ukraine's and Sweden's forestry sector, with particular attention to the role of education and skills development in supporting sector growth and competitiveness. The analysis is situated in the context of ongoing institutional transformations in Ukraine's forestry governance and the broader challenges of post-war recovery, sustainable forest management, and market-oriented workforce development. The study addresses how differences in ownership structure, sector performance, and education systems influence the capacity of forestry actors—state agencies, private owners, and companies—to meet future demands. The analysis is based on a comparative review of sector statistics, recent policy reforms, and existing studies on forestry sector performance in Ukraine and Sweden. The paper highlights significant structural differences between the two countries. Ukraine's forestry sector is predominantly state-owned, with limited market orientation, while Sweden's sector is largely privatized and integrated into the national economy. Despite recent reforms in Ukraine, including the introduction of timber trade regulations and electronic accounting systems, the sector remains constrained by outdated practices, low utilization of timber potential, and weak enforcement of regulations. A key barrier identified is the shortage of market-oriented and business skills among forestry specialists in Ukraine. The forestry education system continues to focus primarily on technical subjects, with little emphasis on economic, environmental, and managerial competencies. The study concludes that building the capacity of forestry professionals in Ukraine requires a shift towards lifelong learning approaches that combine technical knowledge with market, sustainability, and governance skills. This is particularly relevant for Ukraine in the context of post-war reconstruction and the need to modernize its forestry sector to ensure sustainable resource use and economic resilience.

Keywords: Ukraine, forest ownership, forestry education

One lecture more and 50 questions less?

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Meeting the student where he/she is makes the first of seven fundaments for high quality learning. This could mean that in the teaching situation, the teacher does not start from the highest formal level of knowledge required to be qualified for the course, but instead start building knowledge from a significantly lower level with the aim to create the conditions from which the majority of students in the group can advance from. In two courses with general entry requirements (without any special knowledge in math, physics, chemistry or other science subjects), we tried this in a task where elementary school maths was required in the solution. The task had repeatedly been experienced as full of student questions. The pedagogical challenge in this task was to spend enough time to show that everyone actually already knows the math needed and then focus on the real difficulty which is to understand how a timber price list is structured and how to use it. In the courses Sustainable small-scale forestry 1 and 1 + 2, with in total 180 students per year, the majority already have an education and are established in the labor market. The teacher's task was to teach the student group to read a timber price list and calculate the economic value of a few different logs. Instead of doing in the same way as previous years, an additional lecture was provided, with basic math instructions to calculate circular areas and volumes. Then, questions during the course part were compared with questions from the previous year. The number of questions concerning the subject to the teacher decreased between course occasions 2023 and 2024 in line with the teacher experience and as a consequence giving more time for development. Thus, adding recorded lecture time in the course, reduced the student questions and promoted development work. Throughput slightly decreased, but concerning that student hand in assignments also after a course, this decrease was within yearly variations.

The Impact of Education on Climate-Adaptive Forest Management

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Climate change is altering the conditions for forestry, presenting challenges that require both mitigation of these changes and adaptation of forest management to create resilient forests. In southern Sweden, 80% of the forest is managed by private forest owners, whose decisions and actions contribute to the creation of these forests. The Swedish forestry model relies on information, advice, and education to guide forest owners towards the political goals. One example is a 5-year educational concept, Climate-Adaptive Forestry, that is being tested for private forest owners in southern Sweden since 2021. The aim is to increase knowledge about effective ways to adapt forests to a changing climate and reduce the risk of forest damage. This is achieved through meeting arenas such as forest evenings, excursions, demonstration plots, and seminars. The purpose of this study is to determine whether the educational concept affects forest owners' knowledge of climate adaptation, whether climate adaptation is implemented, and if so, what measures are taken. As the first step in a longitudinal study, in 2021, surveys and interviews were conducted with project participants and a comparative group of randomly selected forest owners in southern Sweden. Follow-up surveys and interviews will be conducted again at the end of the project with project participants and a comparative group of randomly selected forest owners. At the start of the project, there was a difference between the groups, with 65% of project participants stating that they adapt their forestry to climate change, compared to 39% of the randomly selected forest owners. A common climate adaptation measure was the choice of tree species, often involving the replacement of Norway spruce with Scots pine or deciduous tree species. Other common examples included creating mixed forests and shortening rotation periods for Norway spruce. The surveys and interviews at the end of the project will evaluate whether the education has influenced knowledge and actions and, if so, how. Knowledge of what has worked well and what can be improved in the education will provide valuable guidance on how future advice and education can be designed.

Forming Future Research and Education on Small-Scale Forestry

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Since 1994, Linnaeus University has been conducting research throughout the entire forest value chain. Today, "Forest Values" is one of the university's prioritized research areas conducted in several different disciplines and in collaboration between various faculties, other universities, and the forest and wood sector. Since 2001, the Linnaeus University has been offering independent academic courses for forest owners and others interested in learning more about the management and ownership of forest properties. Today, over 5,000 people have taken these courses. Closely linked to this educational activity, the need for research for and about private forestry was identified and developed, leading to the formation of the research group "Small-scale Forestry." This group aims to develop educational concepts and research areas related to small-scale forestry and forest ownership. Focus has so far been on private forestry in Sweden, specifically southern Sweden, where about 80% of the forest land is owned by individual forest owners. Research results show how forest policy is implemented, leading forest owners to thin away natural values due to the threat of state takeover of their land. This occurs despite forest owners' willingness to do more for such values. Furthermore, private forest owners are taking many climate adaptation measures. Advice showing that climate adaptation measures can promote many of the forest's values could further motivate the forest owners. The results have been published in scientific and popular science writings and presented orally at conferences. The research has also received attention and dissemination in the media. Studies are ongoing on the effect of forestry education on forest owners and professionals, and research ideas are being developed for the future including present and future competence needs, knowledge gaps and forest ownership changes over time. The group’s work with partners in Estonia, Latvia, the UK and Ukraine forms an important network to further develop research ideas and exchange experiences and new results.

Preparing for post-normal: Lessons learned from the Forest Research Climate Change Hub in the UK

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Background: Climate change presents a key challenge to social-ecological systems worldwide, affecting forests and their management and governance in multiple ways. Many of the challenges associated with this are 'post normal', marked by uncertainty and complexity, value plurality, high stakes, and urgent decisions. This makes forestry a field not only of post normal science but also post normal practice where forestry practitioners make decisions based on incomplete, ambiguous, value-laden, and contradictory evidence. Specific topic: In responding to persisting information and engagement gaps, Forest Research's Climate Change Hub was developed in part, as a response to meeting the demand from UK woodland and forest owners/managers for a single point of information and distilled scientific knowledge that would help them consider adaptive management actions. Methods: In extending the Climate Change Hub, key social science has been conducted to explore further gaps in knowledge and understanding, probing into the resources practitioners and other Hub users require to implement climate change adaptation and mitigation. Based on qualitative and quantitative research as well as a framework of 'post-normal practice' developed in a PhD thesis, this presentation explores the challenges and knowledge needs that practitioners experience. Main results: The findings suggest a need for further guidance on i) adaptation processes across diverse forest types and providing guidance on the use of forestry decision tools to empower Hub users to make informed decisions; and ii) navigating uncertainty and plurality of climate change advice to help Hub users navigate conflicting, ambiguous, and competing evidence as well as diversity in underlying policy and management objectives. Conclusion: The research concludes that the application of scientific advice can be increased by utilising co-design approaches that invite a diverse range of practitioners to contribute to resource design, thus building on practitioners' management objectives, existing skills and knowledge, and national, regional and local contexts. Apart from the provision of accessible information, a culture and appreciation of lifelong learning among scientists and practitioners facilitates an evolving discourse that successfully navigates uncertainty, complexity, and pluralism.

Forest and wood education in Estonia: Does current forest education fulfil societal needs?

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When comparing the competence provision from educators to society, the education systems in European countries show some basic similarities They tend to build on mandatory school followed by either practically oriented vocational schooling, or theoretically oriented, such as upper secondary school preparatory for higher education. Studying forestry within this frame brings many variants with possibilities to crossing the education paths and other differences depending on the societal needs of countries and historical reasons. This study analyses forestry and wood-related education in Estonia and its alignment with labor market demands. We reviewed the formal education framework and conducted interviews with small-scale forest CEOs, forest owner associations, industry representatives, civil servants, and NGOs to assess current and future competence needs. Estonia's education system begins at age 7 and includes vocational, technical, or academic pathways during secondary education (ages 12–18). Some vocational programs allow students to take Centralized Examinations and access higher education. Upper secondary vocational education and flexible higher education options, including part-time study, are also available. Forestry education in Estonia includes flexible technical training ranging from one week to three years. Forest owners can also engage in professional or short-term courses, often facilitated by associations, or learn informally through peer exchange. Future forestry education must increasingly address the ecological, economic, social, and cultural functions of forests. Communication skills, digital competencies, and integration of smart technologies are becoming essential. Risk management is also a key focus for building resilient forest systems. Labour market forecasts predict a growing need for diverse logging methods, forest regeneration, and tending activities. However, there is a declining interest among younger workers in physically demanding tasks like brush cutting and manual logging. This highlights a need for operators trained in silviculture and adept with mini-harvesters, brush cutters, and planting machinery. Demand is rising for specialized short-term courses to address labour shortages, particularly in fields lacking dedicated curricula or recent graduates with relevant skills. For forest owners, key training needs include planning forestry operations, aligning harvesting with natural processes, and climate change adaptation. New owners especially require foundational training to manage their land effectively.

Carbon-related ecosystem service evaluation of riparian forest buffer zones in the hemiboreal region

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Ecosystem services (ES) originate from ecosystem functions and refer to the benefits people receive from specific ecosystems. ES can be divided into three larger groups: provisioning, regulation and supporting, and cultural. Riparian forests are valuable ecosystems that serve both ecological and recreational purposes. While they provide various ecosystem services, this study focuses on the provisioning services of timber and carbon storage potential to address knowledge gaps. Growing societal demands and conservation policies are driving more inclusive forest management. In Latvia, all rivers have a fixed-width buffer based on the river's length; small rivers have a 0-10m buffer, but larger 0-50 m buffer, where forest management activities are prohibited. A quantitative assessment of the provisioning ecosystem services in protected riparian forest buffer zones could provide insight into the impact of protection regulations. In this study, we aim to compare the provision of different ES in the riparian forest protected buffer strips adjacent to the stream (0-10; 0–50 m) with an ES distance of 51–200 m from the stream bank without protection. The results indicate that most assessed ecosystem services (above- and below-ground C stock, C stock of timber assortments, and total growing stock) are higher in riparian forest adjacent zones compared to distant zones. A comparison between adjacent zone distances from waterbodies indicates that evaluated provisioning ES values increase from 10 to 50m. However, the amount of firewood is more considerable closer to the waterbody (first 10 meters). The obtained results suggested that the current protection status of riparian forest buffer zones has facilitated the provision of several timber and carbon storage-related ecosystem services. However, the first 10m from waterbodies is more susceptible to disturbances. Recognizing diverse ecosystem services helps forest managers adapt new methods, integrate ES into forest planning, enhance profitability and biodiversity, sustain the forest sector, and fulfill society's needs.

Keywords: Buffer zones, ecosystem quality, provisioning services, recreation, society needs

Seedling from pine weevil *(Hylobius abietis)*: How expensive can it be?

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Over the last decades, the accelerating changes in climate have led to alterations in the relationship between forest pests, their food base, and their natural enemies. The increases in climate extremes contribute to the spread of forest pests, aggravating the risks to forest regeneration. Warming accelerates the spread of forest pests, with large pine weevil (Hylobius abietis) considered one of Europe's most influential conifer pests, where it is estimated to cause 120 M Euro losses annually. Preventive measures are crucial, as unprotected seedlings can suffer as high as 60-80% damage. This study aimed to assess the effect of weevil-induced mortality of young trees on the economic benefits after clear-felling in pine and spruce stands. This study analyses the economic benefits depending on the damage caused by the pine weevil (5-60% damage) and predicts the benefits when the stand reaches the target diameter. Using a customised growth progression model, the timber volume to be harvested and the distribution of assortments were modelled to calculate the economic benefits at current timber market prices. Low levels of damage were estimated not to have a statistically significant or practically important effect on economic benefits. Medium and high levels of damage significantly affected economic benefits, as in addition to initial planting, restocking, re-management and other silvicultural measures are required, which significantly reduce benefits after the main harvest. However, assessment of the frequency of such damage and damage caused by other stressors (drought, animals, other pests) is still needed. It is important to protect seedlings against the pine weevil to minimise potential damage, ensure successful reforestation, and maintain economic benefits.

Keywords: Economics, conifers, pine weevil, stand density

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