



Annual Report 2025

Department of Forest Resource Management, Faculty of Forest Sciences, SLU

Dear Reader

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The Department of Forest Resource Management leads Swedish terrestrial environmental and resource monitoring through its environmental monitoring and assessment (EMA) activities, research, and teaching. We provide objective decision support for various stakeholders to meet society's needs. For future generations and ourselves, this support must be comprehensive and of high quality.

Our EMA flagships (Swedish National Forest Inventory and the National Inventories of Landscapes in Sweden) track historical trends and the current state of forests, while the Heureka simulation system provides insights into the future. Our research focuses on enhancing monitoring methods (Forest Remote Sensing, Forest Inventory and Sampling, Mathematical Statistics Applied to Forest Sciences) and promoting sustainable resource use (Forest Planning and Landscape Studies). We are proactive in identifying emerging challenges. Our teaching spreads knowledge and ensures a skilled workforce within and beyond SLU. To succeed, we prioritise an efficient organisation where support functions play a vital role, built on cooperation toward shared goals.

The Annual Report 2025 presents highlights from the year. The department was involved in several government and European Union assignments e.g. about carbon reporting under climate frameworks and the proposal for a forest monitoring regulation.

Many grant applications were made on both the research side and the EMA-side. For example, WindyForests (Formas), led by Doctor Isabella Hallberg-Sramek, Mitigating crown fire risk in Fennoscandia (Formas), led by Docent Inka Bohlin, and ELEVETE, led by Docent Sven Adler. All EMA flagships delivered. The department was involved in planning a new civil engineering program. The support functions were both efficient and service minded. I am proud to work on our important tasks together with a team where everyone contributes!

A lot happened on the personnel side:

- Ritwika Mukhopadhyay and Alice Penanhoat were recruited as post-doctors at the Division of Forest Remote Sensing
- Olivia Fors, Petter Ideström and Wilson Lara were recruited as research engineers at the Division of Forest Remote Sensing
- Alice Penanhoat, Sanna-Kaisa Riihimäki and Chiara Zabeo were recruited as research assistants at the Division of Forest Remote Sensing
- Anton Eklund was recruited as a system developer at the Division of Forest Remote Sensing
- Ameenat Adesina and Sushmita Dam were recruited as doctoral students at the Division of Forest Remote Sensing
- Carl Vigren was recruited as a post-doctor at the Division of Forest Resource Analysis
- David Ellison was recruited as a researcher at the Division of Forest Resource Analysis
- Arvid Sjöberg was recruited as a doctoral student at the Division of Forest Resource Analysis
- Benjamin Feit was recruited as an environmental assessment specialist at the Division of Landscape Analysis
- Fredrik Johansson was recruited as an environmental assessment assistant at the Division of Forest Resource Data
- Fanny Nilsson Mäkikälto and Jenni Önskog were recruited as environmental assessment analysts at the Division of Forest Resource Data
- Sofia Forbord was recruited as a personnel administrator at the Administrative Unit
- Mats Walheim retired after long and loyal service

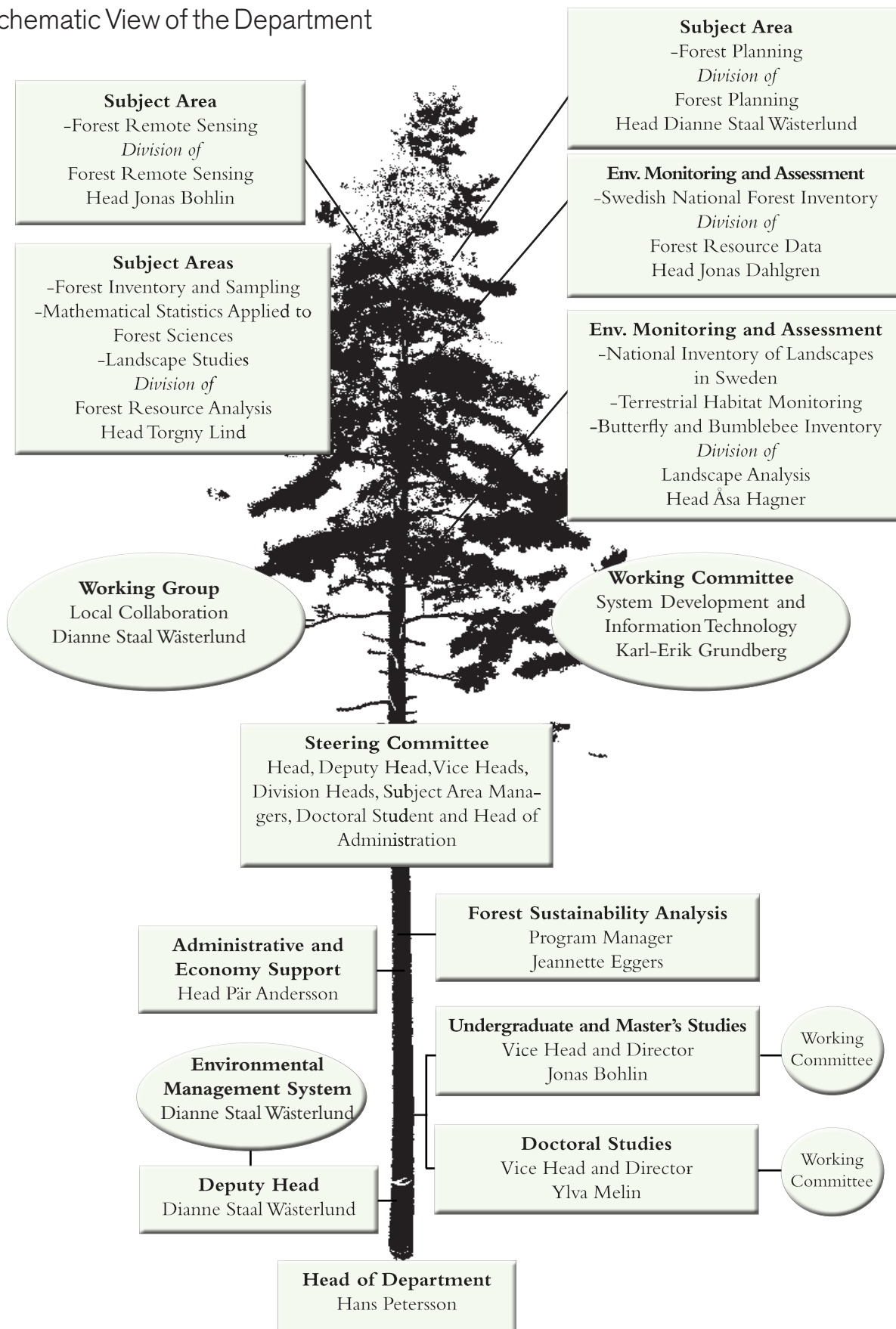
We hope you will enjoy reading this annual report and do not hesitate to contact us if you would like to find out more about the activities touched upon here. We would be more than pleased to share our knowledge and experiences with you!

Hans Petersson
Head of Department

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Ylva Melin, SLU

Organisation

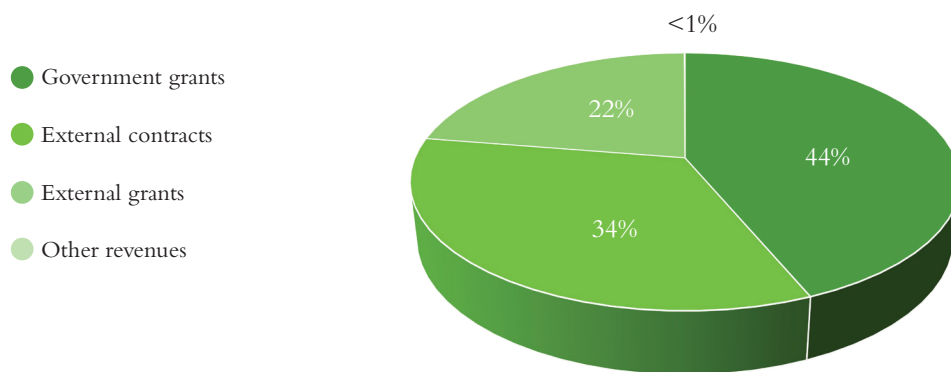
Schematic View of the Department



Facts and Figures

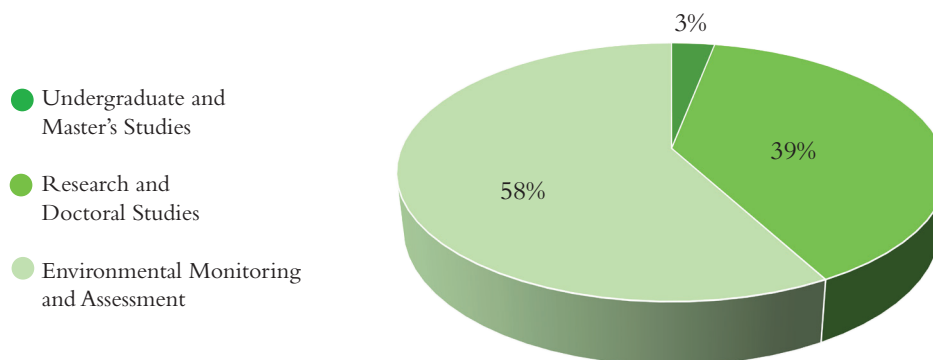
Revenues

Revenues (1000 SEK)	Undergraduate and Master's Studies	Research and Doctoral Studies	Environmental Monitoring and Assessment	Support Function	Total
Government grants	4 482	28 976	49 314	0	82 773
External contracts	295	3 974	59 121	646	64 035
External grants	232	41 275	627	265	42 398
Other revenues	37	55	12	0	104
Total	5 046	74 280	109 073	911	189 310



Costs

Costs (1000 SEK)	Undergraduate and Master's Studies	Research and Doctoral Studies	Environmental Monitoring and Assessment	Support Function	Total
Staff	2 919	44 122	64 479	10 392	121 911
Premises	576	3 868	2 775	-1 058	6 162
Other operative expenses	188	8 163	21 894	3 342	33 587
Depreciation	108	1 708	255	15	2 086
Overhead	1 845	15 084	18 693	-11 780	23 842
Total	5 636	72 945	108 096	911	187 588



External Contracts and Grants

Financier	Revenues (million SEK)
Swedish Environmental Protection Agency	44.3
EU	11.9
Formas	7.0
Arbio	5.5
Stora Enso skog AB	3.0
Swedish Board of Agriculture	2.6
Swedish Foundation for Strategic Research	1.8
The Swedish Forest Society	1.8
Kempe Foundations	1.7
Swedish Forest Agency	1.5
Swedish National Space Board	1.0
EBSCO International inc.	0.9
Hildur and Sven Wingquist's Foundation	0.8
Forestry Research Institute of Sweden	0.8
RISE Research Institutes of Sweden AB	0.7
Vinnova	0.6
Sveaskog	0.4
Ljungberg's Foundation	0.4
IVL Swedish Environmental Research Institute	0.3
Bo Rydin Foundation for Scientific Research	0.3
Earthworm foundation	0.3
Foundation Seydlitz MP bolagen	0.3
Swedish Forest-Owner Plans AB	0.3
SCA	0.3
Sida	0.2
Saami Parliament	0.2
County Administrative Boards	0.2
Zephyr skogskonsult	0.2
Holmen Skog	0.1
NIBIO (Norwegian Institute of Bioeconomy Research)	0.1
Statistics Sweden	0.1
The Church of Sweden	0.1
Nordic Forest Research Co-operation Committee	0.1
Others	16.5
Total	106.4

Personnel Categories

Staff	Number of Work-Years★
Professors	4.7
Senior lecturers	1.7
Researchers	17.7
Postdoctoral researchers	5.2
Doctoral students	15.6
Other teachers	1.9
Administrative staff	9.5
Technical staff	42.2
Technical staff (field)	39.6
Total	138.1

★These figures show the number of work-years at the Department. It's not a true reflection of the numbers of employees.

Undergraduate and Master's Studies

Vice Head and Director: Jonas Bohlin

The department is a large contributor to the undergraduate and master education within the forest faculty. Our education in forest mensuration, forest modelling and forest planning are core topics in the university's responsibility of being a sector university for forestry. Therefore we are largely involved in the BSc and MSc programs in forestry but also other programs within the university. Our course offering amounts to about 70 ECTS credits at the undergraduate level and 50 ECTS credits at the Master's level. We offer courses in the following five subjects: remote sensing and geographic information systems (GIS); forest inventory; forest planning; mathematical statistics; and organisation and leadership. The individual courses for each subject are shown in the table below, divided into undergraduate and Master's levels.

Master Theses

Forest Remote Sensing

Fors, Olivia, 2025. Predicting stem number, diameter distribution and Gini index in Swedish forest by an enhanced area based approach using individual trees on national LiDAR data.
Supervisor: Jonas Bohlin

Sjöberg, Arvid, 2025. Enhancing Alpine Vegetation Mapping: Integrating AI with Aerial, Satellite and LiDAR data.
Supervisor: Sven Adler

Forest Inventory and Sampling

Bertilsson, Edvin, 2025. Evaluation of tree height estimation in young forest stands.
Supervisor: Torgny Lind

Forest Planning

Karlsson, Signe, 2025. Co-ownership of forest properties in Dalarna. Motivation, strategies and management decisions of private forest owners.
Supervisor: Dianne Staal Wästerlund

Nutti Pilflykt, Karin, 2025. Re-inventory of terrestrial lichen coverage, in the winter grazing areas in Sirges reindeer herding community.
Supervisor: Per Sandström

Persson, Johan, 2025. Private Forest Owners' Interest in Digital Services. A Case Study Based on the Kano Model.
Supervisor: Dianne Staal Wästerlund

Courses

Subject	Undergraduate Level (years 1-3) 15-40 students per course	Master's Level (years 4-5) 10-30 students per course
Remote Sensing and GIS, Forest Inventory and Mathematical Statistics	Applied Remote Sensing in Forestry, 7.5 ECTS GIS and Forest Remote Sensing, 7.5 ECTS Mathematical Statistics with Forest Applications, 7.5 ECTS	Advanced Spatial Modelling through GIS, 7.5 ECTS Remote Sensing and Forest Inventory, 15 ECTS Forest Remote Sensing, 7.5 ECTS
Forest Planning	Forest Planning, 15 ECTS Planning and Analyses of Forest Ecosystem Services, 7.5 ECTS Planning and Analyses with the Heureka System - a Forest Decision Support System, 15 ECTS Management Control Systems, 7.5 ECTS	Forest Sustainability Analysis, 7.5 ECTS
Organisation and Leadership		The Forestry from Organisational Theory Related Perspective, 15 ECTS

Doctoral Studies

Vice Head and Director: Ylva Melin

Through course work, seminars and participation in focused research projects, the doctoral programme trains students how to develop and address questions within the doctoral education subjects of forest management, technology, biology and mathematical statistics. Within these subjects, students are supported by a team of experienced supervisors and a network of national and international experts. Additionally, the department offers the unique experience of collaboration with environmental analysts and specialists involved in two major national monitoring programmes, i.e. the Swedish National Forest Inventory and the National Inventory of Landscapes in Sweden.

Doctoral Theses

Forest Remote Sensing

Raul de Paula Pires
Expanding data availability for tree-level remote sensing-based forest inventories.
Acta Universitatis Agriculturae Sueciae.

Mathematical Statistics Applied to Forest Sciences

Lena Gozé
Making better use of sample data: estimation of plant abundance and associated uncertainties.
Acta Universitatis Agriculturae Sueciae.

Forest Planning

Patrik Ulydahl
Recognising information uncertainties in forest planning: incentives and strategies
Acta Universitatis Agriculturae Sueciae.

Landscape Studies

Ulrika Roos
Ground lichen development and consultation between reindeer husbandry and forestry: the past, present and future of samråd in Sweden.
Acta Universitatis Agriculturae Sueciae.



Photo: Jenny Svernås Gillner

Courses

Title	Credits	Participants	Responsible
Forestry for students without a forest education	4.5 ECTS	10	Torgny Lind
Statistics I: Basic statistics	4.0 ECTS	4	Wilmer Prentius
Statistics III: Regression Analysis	4.0 ECTS	21	Magnus Ekström

Research at our Department

Our department conducts research, teaching, and environmental analysis within five complementary subject areas related to sustainable forest and landscape management.

Forest Remote Sensing develops methods for mapping and monitoring forests and vegetation using technologies such as laser scanning, electro-optical sensors, radar, satellites, aircraft, drones, and ground-based systems. These approaches support forest planning, biodiversity conservation, ecological research, and long-term environmental monitoring across multiple spatial scales.

Forest Planning focuses on developing tools, models, and processes that support decision-making in forestry. The research addresses how forests can be managed to balance timber production with biodiversity, climate adaptation, carbon sequestration, recreation, water quality, and other ecosystem services. The field includes research on goal-oriented management, collaboration among stakeholders, and future scenario analyses that evaluate the long-term consequences of different management strategies.

Forest Inventory and Sampling contributes knowledge on field-based inventories, sampling theory, and the development of cost-efficient inventory systems that integrate multiple data sources for forestry and environmental applications.

Mathematical Statistics Applied to Forest Sciences develops statistical methods for analysing complex forest data, supporting modelling, prediction, and evidence-based decision-making.

Landscape Studies examines how landscapes and natural resources are shaped, governed, and used over time, combining interdisciplinary perspectives to support sustainable solutions at local, national, and global levels.



One of our research projects is studying crown fire initiation using experimental burnings to improve understanding of wildfire dynamics and support better risk prediction and management. Photo: Inka Bohlin.

Forest Remote Sensing

Subject Area Leader: Ruben Valbuena

Within forest remote sensing, we work with research, education and development of remote sensing of forests and other terrestrial vegetation. We also help with the processing of remote sensing data as part of SLU's environmental monitoring and assessment. We usually utilise data from optical, laser, or radar sensors. Traditionally, sensor platforms have included satellites, aircraft and drones. Increasingly, we also use sensors placed on the ground or in vehicles to depict trees from the side.

Publications

Scientific Articles

- Anselmetto, N., Morresi, D., Barbarino, S., Loglisci, N., Betts, M.G., and Garbarino, M. (2025) Species distribution models built with local species data perform better for current time, but suffer from niche truncation. *Agricultural and Forest Meteorology*, 362. DOI: 10.1016
- Baglioni, L., Morresi, D., Garbarino, M., Urbinati, C., Lingua, E., Marzano, R., and Vitali, A. (2025) Forestlines in Italian mountains are shifting upward: detection and monitoring using satellite time series. *Biogeosciences*, 22:4349–4366. DOI: 10.5194
- Borghi, C., Francini, S., D'Amico, G., Valbuena, R., and Chirici, G. (2025) Advancements in forest monitoring: Applications and perspectives of airborne laser scanning and complementarity with satellite optical data. *Land*, 14(3):567. DOI: 10.3390.
- Bozzini, A., Huo, L., Brugnaro, S., Morgante, G., Persson, H.J., Finozzi, V., Battisti, A., and Faccoli, M. (2025) Multispectral drone images for the early detection of bark beetle infestations: assessment over large forest areas in the Italian South-Eastern Alps. *Frontiers in Forests and Global Change*, 8. DOI: 10.3389
- Chi, J., Klosterhalfen, A., Nilsson M.B., Laudon, H., Wallerman, J., Larson, J., Lindroth, A., Kljun, N., Fransson, J.E.S., Lundmark, T., and Peich, M. (2025) A managed boreal forest landscape in northern Sweden is a persistent net carbon sink despite large inter-annual weather anomalies. *Agricultural and Forest Meteorology*, 373, DOI: 10.1016
- Chirici, G., Nabuurs, G.J., Francini, S., and Valbuena, R. (2025) Towards more flexible and improved European Forest Information and its governance. Summary and take-home messages of the EFINET project. European Forest Institute. DOI: 10.36333
- Francini, S., Borghi, C., D'Amico, G., Pellett, C., Gobakken, T., Naesset, E., Magnani, F., De-Miguel, S., Nabuurs, G.-J., Valbuena, R., and Chirici, G. (2025) Bridging spatio-temporal gaps in ALS data using Landsat time series and forest disturbance-recovery metrics via multi-task neural networks. *Science of Remote Sensing*, 12. DOI: 10.0313
- Greiser, C., Huo, L., Ghaly, M., Brown, I., Metsu, C., Van Meerbeek, K., and Lehmann, P. (2025) Bark beetles as microclimate engineers – thermal characteristics of infested spruce trees at the canopy surface and below the canopy. *Agricultural and Forest Meteorology*, 375. DOI: 10.1016
- Hart, E. E., Anzaldúa, G., Beaz Hidalgo, V., Valbuena, R., and Warin, C. (2025) Supporting the Development of National Restoration Plans: Insights from EU Green Deal Projects. Publications Office of the European Union.
- Huo, L., Koivumäki, N., Näsi, R., and Honkavaara, E. (2025) Sensitivity analysis of the Green Shoulder indices in pre-emergence detection of single trees attacked by European spruce bark beetle. *International Journal of Remote Sensing*, 3513–3525. DOI: 101080.
- Huo, L., Matsiakh, I., Bohlin, J., and Cleary, M. (2025) Estimation of tree vitality reduced by pine needle disease using multispectral drone images. *Remote Sensing*, 17(2):271. DOI: 10.3390.
- Málaga, N., Requena Suarez, D., Hunka, N., Green, C., McRoberts, R.E., Naesset, E., García-Pérez, J., Aguilar-Amuchastegui, N., Babcock, C., Sanz, M.J., Federici, S., Arana, A., De la Cruz, R., Carranza, J., Rosenqvist, A., Seifert, F.M., Valbuena, R., and Herold, M. (2025) GFOI Rapid Response Module: Guidance to inform the use of space-based forest biomass-related data in MRV procedures. Global Forest Observations Initiative.
- Miettinen, J., Breidenbach, J., Adame, P., Nilsson, M., Westerlund, B., and Wurrpillot, S. (2025) Pan-European forest maps produced with a combination of earth observation data and national forest inventory plots. *Data in Brief*, 60. DOI: 10.1016
- Noumonvi, K.D., Havertz, N.H., Bohlin, J., van der Linden, S., Nilsson, M.B., and Peichl, M. (2025) HuHoLa: A novel Hummock-Hollow-Lawn mire microtopography modelling approach. *Ecological Modelling*, 508. DOI: 10.1016
- Parry, J., Stokes, V., and Hardaker, A. (2025) Scots pine (*Pinus sylvestris*) and silver birch (*Betula pendula*) mixed-species growth dynamics in the North York moors. *Forestry*, 21, DOI: 10.1093
- Parry, J., and Hardaker, A.A. (2025) A review of long-term experiments with species mixtures in Great Britain. *Quartely Journal of Forestry*. 119(1): 20–28. ISSN: 0033-5568
- Pellet, C., and Valbuena, R. (2025) Disentangling dispersion from mean reveals true heterogeneity-diversity relationships. *Nature Communications*, 1(1):6:8532. DOI: 10.1038
- Pires, R.P., Axelsson, C., Lindberg, E., Persson, H.J., Olofsson, K., and Holmgren, J. (2025) Boreal tree species classification using airborne laser scanning data annotated with harvester production reports, and convolutional neural networks. *International Journal of Applied Earth Observation and Geoinformation*, 140. DOI: 10.1016
- Valbuena R., and Gamarra, J.G.P. (2025). Regional assessment of above-ground biomass using field, airborne light detection and ranging and satellite data integration: Methodological document. Food and Agriculture Organization of the United Nations (FAO). Rome. DOI: 10.4060
- Vedovato, L.B., Aragao, L.E.O.C., Almeida, D.R.A., Bartholomew, D.C., Assis, M., Dalagnol, R., Gorgens, E.B., Silva-Junior, C.H.L., Ometto, J.P., Pontes-Lopes, A., Silva, C. A., Valbuena, R., and Feldpausch, T.R. (2025) Impacts of fire on canopy structure and its resilience depend on successional stage in Amazonian secondary forests. *Remote Sensing in Ecology and Conservation*, 11(4):394–410. DOI: 10.1002

Forest Inventory and Sampling

Subject Area Leaders: Anton Grafström & Göran Ståhl

Forest inventory and sampling includes general theory for sampling, field-based forest and landscape inventory, as well as related modelling and development of inventory systems that utilize multiple data sources. Today, forest inventory focuses on features related to several ecosystem services in addition to information on trees and growing stock, such as information on biological diversity and greenhouse gas balances. Within sampling, general methods are developed which also underpin important parts of the forest inventory area. The subject area contributes knowledge for a large number of applications in practical forestry and environmental monitoring.

Publications

Scientific Articles

- Beauchamp, N., Kunstler, G., Touzot, L., Ruiz-Benito, P., Cienciala, E., Dahlgren, J., Hawrylo, P., Klopčič, M., Lehtonen, A., Seben, V., Socha, J., Zavala, M.A., and Courbaud, B. (2025) Light competition affects how tree growth and survival respond to climate. *Journal of Ecology*, 113(3):672–688. DOI: 10.1111
- Grzeszkiewicz, M., Mensah, A.A., Goude, M., Eggers, J., Trubins, R., and Ståhl, G. (2025) Evaluating the performance of mainstream Swedish growth models in uneven-aged forestry systems. *Forest Ecology and Management*, 582. DOI: 10.1016
- Jacobsson, J., Fridman, J., Axelsson, A.L., and Milberg, P. (2025) An aging population? A century of change among Swedish forest trees. *Forest Ecology and Management*, 580. DOI: 10.1016
- König, L.A., Mohren, F., Schelhaas, M.J., Astigarraga, J., Cienciala, E., Flury, R., Fridman, J., Leen, G., Lehtonen, A., Muelbert, A.E., Pugh, T.A.M., Rohner, B., Ruiz-Benito, P., Suvanto, S., Talarczyk, A., Zavala, M.A., Vega, J.M., Staritsky, I., Hengeveld, G., and Nabuurs, G.-J. (2025) Combining national forest inventories reveals distinct role of climate on tree recruitment in European forests. *Ecological Modelling*, 505. DOI: 10.1016
- Rousseau, L.S.A., Sandstad Næss, J., Carrer, F., Amini, S., Brattebø, H., and Hertwich, E.G. (2025) Reducing material use and their greenhouse gas emissions in greater Oslo. *Journal of Industrial Ecology*, 125. DOI: 101111.
- Suvanto, S., Esquivel-Muelbert, A., Schelhaas, M.-J., Astigarraga, J., Astrup, R., Cienciala, E., Fridman, J., Henttonen, H.M., Kunstler, G., Kändler, G., König, L.A., Ruiz-Benito, P., Senf, C., Stadelmann, G., Starcevic, A., Talarczyk, A., Zavala, M.A., and Pugh, T.A.M. (2025) Understanding Europe's Forest Harvesting Regimes. *Earth's Future*, 13(2). DOI: 10.1029
- Tijerín-Triviño, J., Lines, E.R., Zavala, M.A., García, M., Astigarraga, J., Cruz-Alonso, V., Dahlgren, J., and Ruiz-Benito, P. (2025) Forest productivity decreases in response to recent changes in vegetation structure and climate in the latitudinal extremes of the European continent. *Global Ecology and Biogeography*, 34(2). DOI: 10.1111.
- Vigren, C., Vospernik, S., Morin, X., Toigo, M., Bielak, K., Bravo, F., Heym, M., Löf, M., Pach, M., Ponette, Q., and Pretzsch, H. (2025) Divergent regional volume growth responses of Scots Pine and Oak stands to climate change in Europe. *Science of The Total Environment*, 969. DOI: 10.1016

Book chapter

- Lundblad, M., Petersson, H., Karlun, E., Wikberg, P.E., Stendahl, J., Linddahl, A., and Bolinder, M. (2025) Land use, land-use change and forestry (CRT sector 4). In: *National Inventory Document Sweden 2025* –Submitted under the UNFCCC, Swedish Environmental Protection Agency.

Forest Planning

Subject Area Leader: Karin Öhman

Forest planning provides methods and tools that support the sustainable use of forest resources, considering economic, ecological, and social values, and applies these in a range of future analyses. Our research addresses planning issues from both the forest-owner perspective and the stakeholder or societal perspective. Research focusing on the forest owner perspective primarily examines quantitative methods and tools used to translate owners' objectives into medium- and long-term forest plans. The stakeholder and societal perspective is reflected in studies of how different stakeholders can shape the future development of the forest landscape. Our future analyses focus on how various ecosystem services are affected over time and space by different management strategies, and on identifying optimal management approaches under diverse assumptions regarding objectives and climate change.

Publications

Scientific Articles

- Caglayan, I., Eriksson, L.O., Öhman, K., Yesil, A., and Bettinger, P. (2025) Using optimization for maximizing future utility of ecosystem services. *Croatian Journal of Forest Engineering*. DOI: 10.5552
- Englund, G., Eggers, J., Jonsson, B.-G., Schulte, M., and Skytt, T. (2025) Why we disagree about the climate impact of forestry – a quantitative analysis of Swedish research. *Environmental Management*, 75:1923–1937. DOI: 10.1007
- Graf, L., Bohlin, I., Hedwall, P.-O., Dahlgren, J., and Felton, A.M. (2025) Mapping cervid forage in Sweden using remote sensing and national forest inventory data. *International Journal of Applied Earth Observation and Geoinformation*, 144. DOI: 10.1016
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- Jonsson, A., Hjelm, K., Lämås, T., Örlander, G., and Nilsson, U. (2025) Effects of delayed regeneration and slash removal 30 years after establishment of Norway spruce. *Forest Ecology and Management*, 597. DOI: 101016
- Mårald, E., Hallberg-Sramek, I., Priebe, J., and Reimerson, E. (2025) Forms of climate change: when climate, forest, and local community collide. *GeoHumanities*, 11(1). DOI: 101080.
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- Subramanian, N., Lundström, J., Forsell, N., Triviñod, M., Öhman, K., Mönkkönen, M., and Snäll, T. (2025) Increasing global wood demand will risk forest sustainability. *Scandinavian Journal of Forest Research*, 40:5–6:241–257. DOI: 101080
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- Ulvdal, P., Öhman, K., Rönqvist, M., Ståhl, G., Eriksson, L.O., Sängstuvall, L., and Lämås, T. (2025) The role of uncertain forest data in a hierarchical forest planning setting with misaligned objectives. *Canadian Journal of Forest Research*, 5. DOI: 10.1139
- Wilhelmsson, P., Wallerman, J., Lämås, T., and Öhman, K. (2025) Dynamic treatment units in forest planning improves economic performance over stand-based planning. *European Journal of Forest Research*, 144:163–177. DOI: 10.1007.
- Öhman, K., De Pellegrin Llorente, I., Fustel, T., Bohlin, I., Lämås, Y., and Eggers, J. (2025) Integrating wind damage vulnerability into long-term forest planning: An optimisation-based model for spatial decision support. *Trees, Forests and People*, 20. DOI: 10.1016

Book chapter

- Mehtätalo, L., Kangas, A., Eggers, J., Eid, T., Eyvindson, K., Lundström, J., Siipilehto, J., and Öhman, K. (2025). 'Forest Planning and Continuous Cover Forestry'. In *Continuous Cover Forestry in Boreal Nordic Countries*, edited by Pasi Rautio, Johanna Routa, Saija Huuskonen, Emma Holmström, Jonas Cedergren, and Christian Kuehne. Springer Nature Switzerland. DOI: 10.1007

Landscape studies

Subject Area Leaders: Carina Keskitalo & Stefan Sandström

Through an interdisciplinary approach, landscape studies research focuses on the utilisation of landscapes, their multiple resources and their users. Through this research, we contribute to an increased understanding of the socioecological processes and how they change over time and in space. The connections between natural resource use, stewardship, ecosystem production and community development processes are of special interest. Our work builds upon capacities within environmental monitoring, forest impact assessment and work science, including gender studies, policy, and rural development studies.

Publications

Scientific Articles

- Amboka, G.M., Nelima, M., Midega, C.A.O., Mutyambai, D.M., Feit, B., and Jonsson, M. (2025) Elevation and grassland cover shape natural enemy communities in the Kenyan maize crops. *International Journal of Tropical Insect Science*. DOI: 10.1007
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Mathematical Statistics Applied to Forest Sciences

Subject Area Leader: Magnus Ekström

The application of mathematical and statistical methods in forest sciences is challenging due to the great amount of variations present in nature, with complex dynamics that involve variations in both time and space. A wide range of mathematical-statistical methods is studied, developed and applied for collecting, analysing, interpreting and presenting empirical data. Such methods make it possible to draw conclusions based on empirical data and can be used for description, decision-making and prediction within the forest sciences.

Environmental Monitoring and Assessment

SLU is unique among Swedish universities with its strong focus on environmental monitoring and assessments (EMA). Within SLU, our department is also unique, as EMA is the dominating activity (roughly 60 percent of the budget).

For a large set of terrestrial variables, EMA is the long-term monitoring and assessment of stocks and changes in stocks. EMA includes data capture, analysis and reporting. Inventories in the field, remote sensing, or a combination of these two methods, are performed using area-based sampling designs adapted mainly to regional or larger scales. The idea is to carefully measure variables on the sample units, meaning that most of the uncertainty should arise from the fact that only a sample and not the entire population is measured. The uncertainty of estimates can be controlled by an efficient design and a large sample, and it is possible to predict the accuracy of the estimates. EMA is an efficient way to monitor “how much” without disturbing the population, while an experimental design focuses on explaining “why” in a well-defined manipulated area. Projections and scenarios about the future of terrestrial variables, often based on data from the monitoring programmes, are also considered part of EMA activities.



Drone image of a mixed broadleaf forest in Västerbotten on a sunny early summer day. Photo: Isak Öhman

Swedish National Forest Inventory

Program Manager: Cornelia Roberge

Swedish National Forest Inventory SLU is the authority responsible for national official statistics in the area of forest state and change. Statistical products consist of area conditions, growing stock and tree biomass, annual growth, vegetation and habitat conditions, and forest damage. The Swedish National Forest Inventory (NFI) operates within the department to fulfil SLU's statistical responsibility and provides data for other EMA-programs and research. Through an annual field survey of sample plots spread across the entire country, data are collected for compilation and presentation of official statistics. The results are published annually in the publication Skogsdata, which can be downloaded in pdf format from our website. All official statistics are also available for download from our website in multiple formats, including APIs as well as on the Swedish and EU data portals. Directed forest damage inventories are also performed at the section and during 2024 one such inventory was carried out on behalf of the Swedish Forest Agency to estimate spruce bark beetle damage in south Sweden.



A dachshund ("taxen") in a forest together with inventory equipment as part of National Forest Inventory (NFI) fieldwork. Photo: Haidi Andersson

Forest Sustainability Analysis

Program Manager: Jeannette Eggers

The Forest Sustainability Analysis (SHa) programme works with qualitative and quantitative analyses of the potential of forest ecosystems to provide various forms of ecosystem services in the long term. Through the programme, policy-makers, decision-makers and planners within a range of sectors in society, e.g. forestry, environment and energy, have access to expertise, analytical tools and decision support for issues related to forest development. The Heureka decision-support system is a central tool in most SHa analyses.

National Inventories of Landscapes in Sweden

Program Managers: Henrik Hedenås & Hans Gardfjell

The National Inventories of Landscapes in Sweden (NILS) collect, analyse, and present comprehensive data on the state and changes of the Swedish nature over time. NILS operates as a national environmental monitoring program integrating multiple inventories for efficient administration, analysis, data management, aerial inventory, fieldwork, and training - ensuring cost-effective and synergistic operations. Inventories primarily focuses on alpine regions, grasslands, old deciduous forests, raised bogs, and seashores. A key application of the collected data is reporting on the area and quality of habitats listed in Annex I of the EU's Habitat Directive. Furthermore, our data is used to monitor progress towards the Swedish Environmental Objectives and the development of national land cover data. To address the challenge of surveying diverse natural environments, including both common and uncommon habitats, NILS has developed a flexible sampling design. This design enables tailor inventories based on specific factors, such habitat frequency habitats, regional requirements, and technological advances. The Swedish Environmental Protection Agency and the Swedish Board of Agriculture commission our inventories.

NILS Grassland inventory

A national inventory of all types of grassland, with extra focus on grasslands with high nature values, listed in Annex I of the EU's Habitat Directive. The inventory started in 2020.

NILS Deciduous forest inventory

A national inventory complementing the National Forest Inventory. It focusing on old deciduous forests including broad-leaf forests, swamp deciduous forests, alluvial deciduous forests and other old deciduous forests. The inventory started in 2020.

NILS Alpine inventory

A national inventory of the alpine area, with a focus on habitats with high nature values as designated in Annex I of the EU's Habitat Directive. The collected data contribute to the evaluation of the environmental objective a Magnificent Mountain Landscape. The inventory started in 2006 with a break during the years 2021 and 2022.

NILS Wetland inventory

NILS was tasked with designing a pilot study on wetlands, specifically focusing on raised bogs. In 2023, a national inventory of raised bogs was initiated, with particular attention given to those with high nature values as designated in Annex I of the EU's Habitat Directive.

THUF Seashore inventory

A national inventory of the Swedish coast and archipelago, concentrating on habitats included in Annex I of the EU's Habitat Directive. The inventory started in 2012.

FHIN Butterfly and bumblebee inventory

A long-term nationwide monitoring program assessing biodiversity and quality in semi-natural grasslands. The collected data contribute to the evaluation of the environmental objective a Varied Agricultural Landscape. The inventory started in 2006 with a break during the years 2021 and 2022.

NILS Initial inventory 2003-2020

The initial NILS inventory aimed to monitor biodiversity in all terrestrial environments in Sweden tracking changes in the everyday landscape. An important part of the program was to study changes in landscape composition and structure that may affect biodiversity. By integrating these inventories under a unified program, NILS enhances efficiency and ensures comprehensive environmental monitoring across Sweden's diverse landscapes.

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Many of the staff in Forest Planning also work within the Forest Sustainability Analysis program.

Field Staff

Every year, the department organises and implements extensive inventories of forests and landscapes in Sweden. To conduct this work, we employ a number of field workers.

Swedish National Forest Inventory

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