SLU

Department of
Forest Resource Management

Annual Report 2019

Contents

Dear Reader,

After almost twelve years as Head of Department, it's now time to hand over the reins to Hans Petersson, who was appointed as the new Head of Department from July 1, 2019. It has been a great privilege and an absolute honor to serve you all and I have really enjoyed working with all of you. Eventually everything comes to an end and after four mandate periods I'm now looking forward to do more research and teaching as well as a little bit of environmental monitoring. However, I will not leave the Head of Department duties completely, but will now take on the role as

Deputy Head to, hopefully, facilitate a smooth change. I wish Hans all the best as the new Head of Department!

As new Head of Department, I would like to take the opportunity to thank Johan for his great efforts in building up an efficient academic organization. He has meant a great deal to the Department and I hope that the employees are tolerant of the fact that it takes a long time to become reasonably as professional and well-liked Head of Department as my predecessor. I wish Johan all the best in his continued career at the Department!

This annual report is divided into the main fields of activities of the Department: Undergraduate, Master's and Doctoral studies, research within five subject areas as well as five environmental monitoring and assessment programs. Also included in this report are the schematic view of the Department's organization, facts and figures and at the end a compilation of names of the field staff.

A lot has happened during the past year and we have in the following selected some important events. First of all, the Mistra Digital Forest research program started in early 2019. The program focuses on digitalization of the

forestry sector to integrate the entire value chain. The approach is foreseen to give a positive environmental impact on society and on Swedish competitiveness. It will also greatly contribute to Sweden's conversion to a circular bioeconomy and to climate change mitigation. In May, we celebrated a century of a successful Norwegian National Forest Inventory. More than 200 researchers from 30 countries celebrated on site at Sundvolden Hotel outside Oslo, and a large number of participants were also active in the associated workshop. Also, in May, Karin Öhman, Professor in Forest Planning, gave an exciting and inspiring installation lecture. In the autumn, many researchers and doctoral students from the Department participated in the IUFRO's World Congress in Brazil. The Vice-Chancellor visited the Department during the autumn and we hope that she was inspired by our activities and satisfied with her visit. Finally, the BuSK (NPA) project was the winner of the Artic award in the category "sustainable use of resources" – a project run by Gun Lidestav, Per Sandström and Stefan Sandström. Congratulations!

All of the achievements of the Department are, of course, based on a combination of individual and team efforts, contributions that all definitely deserve to be mentioned. This is unfortunately an impossible task. Nevertheless, we would like to highlight a few important events with respect to the staff during 2019:

- Osmo Mattila and Langning Huo were employed as Postdoctoral Researchers
- Mattias Danielsson and Patrik Ulvdal were employed as Doctoral Students
- Emma Heinerud and Johanna Lindström were employed as Auxiliary Research Assistants
- Marcus Hedblom earned the competence of Associate Professor in Biology with focus on Landscape Studies
- Anton Grafström earned the competence of Associate Professor in Mathematical Statistics with focus on Forest Inventory and Sampling
- Henrik Persson earned the competence of Associate Professor in Technology with focus on Forest Remote Sensing
- Rickard Westerlund was employed as System Developer
- Jeanette Eggers and Inka Bohlin were employed as Researchers
- Hilda Mikaelsson and Anton Larsson were employed as Environmental Monitoring Analysts
- Hans Petersson was appointed as Head of Department
- Johan Fransson was appointed as Deputy Head of Department
- Dianne Staal Wästerlund was appointed as Vice Head of Local Collaboration
- Oskar Thurén was employed as Economy Officer and Johanna Nilsson was employed as Human Resources Administrator
- Jonas Bohlin was appointed as Head of the Division of Forest Remote Sensing
- Sören Wulff was appointed as Head of the Division of Forest Resource Data
- Mathias Kristoferqvist was employed as Research Assistant
- Mattias Danielsson, Mikael Hertz, Maria Spencer and Mattias Nyström left for other duties
- Henrik Feychting and Erik Wihelmsson retired after a long, deserving 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!

Johan Fransson
Head of Department
2008-01-01 – 2019-06-30

Hans Petersson
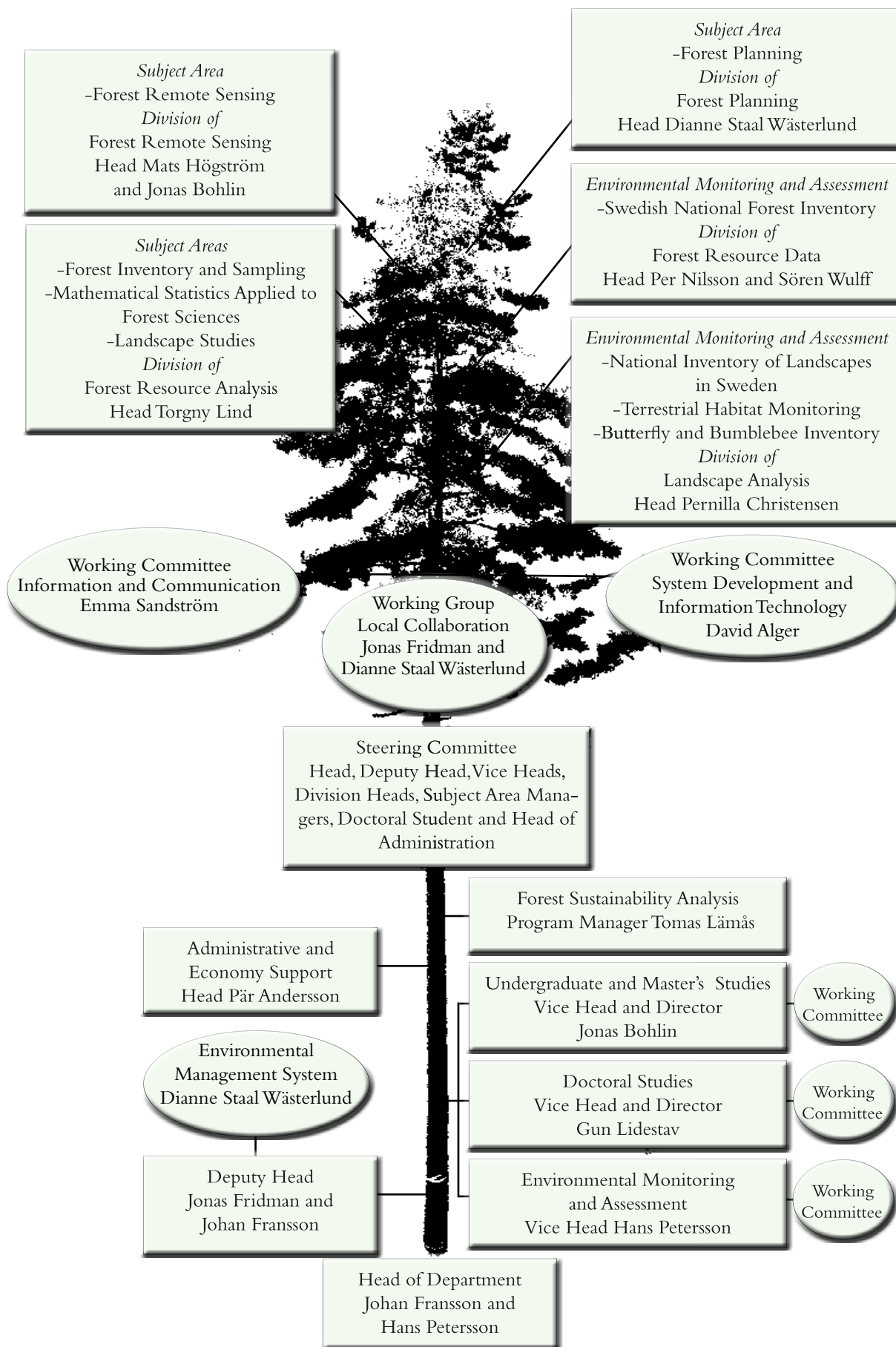Head of Department
2019-07-01 – 2022-06-30

Organization

Schematic View of the Department

Subject Area
–Forest Remote Sensing
Division of
Forest Remote Sensing
Head Mats Högström
and Jonas Bohlin

Subject Areas
–Forest Inventory and Sampling
–Mathematical Statistics Applied to
Forest Sciences
–Landscape Studies
Division of
Forest Resource Analysis
Head Torgny Lind

Subject Area
–Forest Planning
Division of
Forest Planning
Head Dianne Staal Wästerlund

Environmental Monitoring and Assessment
–Swedish National Forest Inventory
Division of
Forest Resource Data
Head Per Nilsson and Sören Wulff

Environmental Monitoring and Assessment
–National Inventory of Landscapes
in Sweden
–Terrestrial Habitat Monitoring
–Butterfly and Bumblebee Inventory
Division of
Landscape Analysis
Head Pernilla Christensen

Working Committee
Information and Communication
Emma Sandström

Working Group
Local Collaboration
Jonas Fridman and
Dianne Staal Wästerlund

Working Committee
System Development and
Information Technology
David Alger

Steering Committee
Head, Deputy Head, Vice Heads,
Division Heads, Subject Area Mana-
gers, Doctoral Student and Head of
Administration

Administrative and
Economy Support
Head Pär Andersson

Environmental
Management System
Dianne Staal Wästerlund

Deputy Head
Jonas Fridman and
Johan Fransson

Forest Sustainability Analysis
Program Manager Tomas Lämås

Undergraduate and Master's Studies
Vice Head and Director
Jonas Bohlin

Working Committee

Doctoral Studies
Vice Head and Director
Gun Lidestav

Working Committee

Environmental Monitoring
and Assessment
Vice Head Hans Petersson

Working Committee

Head of Department
Johan Fransson and
Hans Petersson

Steering Committee Staff:

Pär Andersson
Jonas Bohlin
Pernilla Christensen
Magnus Ekström
Ola Eriksson
Johan Fransson
Jonas Fridman
Ivan Huuva
Mats Högström
Gun Lidestav
Torgny Lind
Per Nilsson
Håkan Olsson
Hans Petersson
Sören Wulff
Dianne Staal Wästerlund
Karin Öhman

Administrative and
Economy Staff:

Head of Administration
Pär Andersson

Economy Officers
Ylva Jonsson
Maria Spencer
Oskar Thurén

Administrators
Veronika Bredberg
Nanna Hjertkvist
Johanna Nilsson
Sofia Sjögren

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	4 197	19 419	38 255	0	**61 871**
External contracts	260	5 868	32 273	195	**38 596**
External grants	38	19 794	7 167	208	**27 207**
Other revenues	0	1 169	1 179	0	**2 348**
Total	4 495	46 250	78 874	403	130 022

- Government grants
- External contracts
- External grants
- Other revenues

(48%, 30%, 21%, 2%)
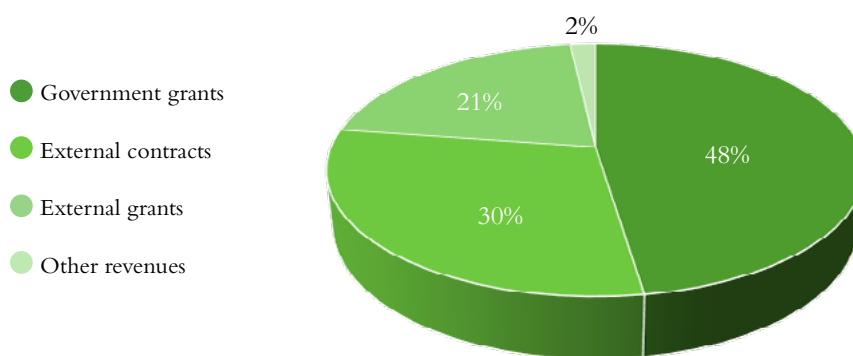
Costs

Costs (1000 SEK)	Undergraduate and Master's Studies	Research and Doctoral Studies	Environmental Monitoring and Assessment	Support Function	Total
Staff	2 524	25 659	47 676	8 065	83 924
Premises	440	2 366	2 445	1 024	6 275
Other operative expenses	77	4 589	13 594	1 924	20 184
Depreciation	93	358	169	30	650
Overheads	1 767	9 738	15 777	–10 640	16 642
Total	4 901	42 710	79 661	403	127 675

- Undergraduate and Master's Studies
- Research and Doctoral Studies
- Environmental Monitoring and Assessment

(4%, 33%, 62%)
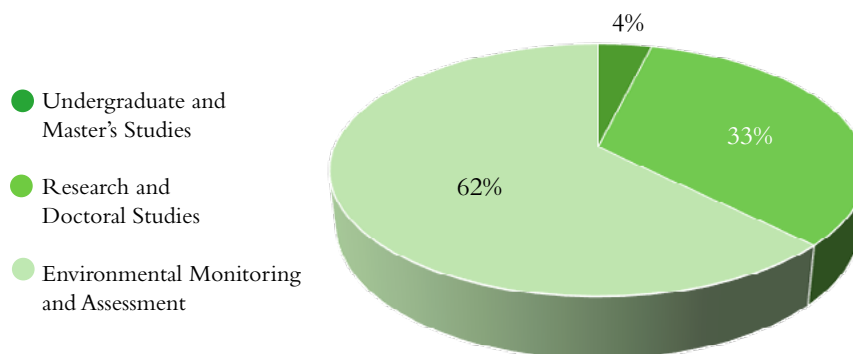
External Contracts and Grants

Financier	Revenues (million SEK)
Swedish Environmental Protection Agency	26.6
Formas	4.1
Swedish Board of Agriculture	2.8
Swedish National Space Agency	1.9
Hildur and Sven Wingquist's Foundation	1.6
EU	1.3
The Royal Swedish Academy of Agriculture and Forestry	1.3
The Swedish Forest Society	1.2
Ljungberg's Foundation	1.1
Boliden Mineral AB	0.9
Albania	0.9
SCA	0.9
Vinnova	0.9
USDA	0.9
Bo Rydin Foundation for Scientific Research	0.9
The ÅForsk Foundation	0.9
Kempe Foundations	0.8
Swedish Forest Agency	0.7
Saami Parliament	0.7
Food and Agriculture Organization of the United Nations (FAO)	0.6
County Administrative Boards	0.6
Swedish Energy Agency	0.4
Forestry Research Institute of Sweden	0.4
Sveaskog	0.3
Bergvik Skog	0.3
Holmen Skog	0.2
Carl Trygger's Foundation	0.2
Northern Research Institute (NORUT)	0.2
Swedish Forest–Owner Plans AB	0.2
Skogstekniska klustret	0.2
RICE ETC AB	0.2
Brattås Foundation	0.2
Önnesjö Foundation	0.1
Södra's Research Foundation	0.1
The National Property Board of Sweden	0.1
The Church of Sweden	0.1
Others	11.0
Total	65.8

Personnel Categories

Staff	Number of Work–Years*
Professors	2.8
Senior lecturers	1.9
Associate senior lecturers	3.9
Researchers	21.0
Postdoctoral researchers	1.3
Doctoral students	7.6
Other teachers	1.6
Administrative staff	6.5
Technical staff	36.3
Technical staff (field)	32.3
Total	115.2

*These figures show the number of work–years at the Department. It's not a true reflection of the number of employees.

Vice Head and Director
Undergraduate and
Master's Studies
Jonas Bohlin

Undergraduate and Master's Studies

The Department is a major contributor to SLU's Master of Forestry Program (Jägmästarprogrammet). Our course selection amounts to about 40 ECTS credits at Undergraduate level and 45 ECTS credits at Master's level. The courses are given in the following five subjects: Remote Sensing and Geographic Information Technology (GIT), Forest Inventory, Forest Planning, Mathematical Statistics and Organization and Leadership. The individual courses for each subject are shown in the table below, divided into Undergraduate and Master's level.

Master's Theses

Remote Sensing

Larsson, Karl, 2019. Skattningar av ståndortsindex: Med flygburen laserskanning, allmänt tillgänglig information eller skördarmätningar? Supervisor: Jörgen Wallerman.

Forest Planning

Strömberg, Johanna, 2019. Virkesköparens roll: En kvalitativ studie om uppsökande verksamhet och virkesköparens säljegenskaper. Supervisor: Dianne Staal Wästerlund.

Wikman, Henrik, 2019. Skattning av skogsbestånds kapitalförräntning utifrån Skogliga grunddata. Supervisor: Erik Wilhelmsson.

Forssén, Linnea, 2019. Målkonflikter och styrning i fjällnära skog. Supervisor: Gun Lidestav.

Linde, Elin, 2019. Återställa och bevara: En tvärsektoriell ansats vid restaurering av flottningsleder i Njakafjällsområdet. Supervisor: Gun Lidestav.

Persson, Magnus, 2019. Köpprocessen av skogsfastigheter: Köparens, säljarens och mäklarens perspektiv. Supervisor: Gun Lidestav.

Forest Inventory

Ramberg, Åsa, 2019. Pine production comparison: Production potential of Loblolly pine (*Pinus taeda*) and Slash pine (*Pinus elliottii*) in the southeastern USA in relation to initial density and forest management. Supervisor: Torgny Lind.

Courses

Subject	Undergraduate Level (years 1-3) 40-80 students per course	Master's Level (years 4-5) 10-60 students per course
Remote Sensing and GIT, Forest Inventory and Mathematical Statistics	Basic GIT, 3 ECTS Introduction to Tree and Stand Measurement, 1 ECTS Measurement of Site Index, 1 ECTS Statistics and Forest Inventory, 15 ECTS Laser Scanning and Digital Photogrammetry in Forestry, 7.5 ECTS (given outside the Master's program)	Advanced GIT, 7.5 ECTS Remote Sensing and Forest Inventory, 15 ECTS
Forest Planning	Forest Management Planning, 4 ECTS Introduction to Forest Planning, 3.5 ECTS	Forest Sustainability Analysis, 7.5 ECTS
Organization and Leadership	Gender competence for the forestry sector, 7.5 ECTS Individual and Group Leadership, 0.3 ECTS	The Forestry from Organizational Theory Related Perspective, 15 ECTS

Doctoral Studies

Through course work, seminars and participation in focused research projects, the doctoral program trains students in how to develop and address questions within the research subjects of Forest Management and Products, Technology, Mathematical Statistics and Biology. Within these subjects the students are supported by a team of experienced supervisors and a network of national and international expertise. The Department additionally offers an unique experience of collaboration with environmental analysts and specialists involved in two major national monitoring programs, i.e. the Swedish National Forest Inventory and the National Inventory of Landscapes in Sweden.

Vice Head and Director
Doctoral Studies
Gun Lidestav

Courses

Title	Credits	Participants	Responsible
Statistics I: Basic Statistics	4.0 ECTS	9	Magnus Ekström
Statistics III: Regression Analysis	4.0 ECTS	6	Wilmer Prentius Magnus Ekström
Multivariate Statistics	4.0 ECTS	8	Magnus Ekström
Introduction to Multi-Criteria Decision Analysis	4.5 ECTS	9	Eva-Maria Nordström

Forest Remote Sensing

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 within the framework 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 small, unmanned aircraft vehicles (so-called UAVs or drones). Increasingly, we also use sensors placed on the ground or in vehicles, which depict trees from the side.

Subject Area Manager
Håkan Olsson

Staff
Peder Axensten
Inka Bohlin
Jonas Bohlin
Mikael Egberth
Johan Fransson
Ann-Helen Granholm
Johan Holmgren
Mats Högström
Jonas Jonzén
Eva Lindberg
Mats Nilsson
Mattias Nyström
Kenneth Olofsson
Henrik Persson
Emma Sandström
Jörgen Wallerman

Postdoctoral Researcher
Langning Huo

Doctoral Students
Arvid Axelsson
Ivan Huuva
Nils Lindgren
André Wästlund

Publications

Scientific Articles

- Askne, J.I.H.; Persson, H.J. & Ulander, L.M.H. (2019). On the Sensitivity of TanDEM-X-Observations to Boreal Forest Structure. Remote Sensing. 11(14).

- Burian, A.; Karaya, R.; Wernersson, J.E.V.; Egberth, M.; Lokorwa, B. & Nyberg, G. (2019). A community-based evaluation of population growth and agro-pastoralist resilience in Sub-Saharan drylands. Environmental Science and Policy. 92:323-330.

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- Holmgren, J.; Tulldahl, M.; Nordlöf, J.; Willén, E. & Olsson, H. (2019). Mobile Laser Scanning for Estimating Tree Stem Diameter Using Segmentation and Tree Spine Calibration. Remote Sensing. 11(23).

- Holmgren, J. & Lindberg, E. (2019). Tree crown segmentation based on a tree crown density model derived from Airborne Laser Scanning. Remote Sensing Letters. 10(12):1143-1152.

- Hovi, A.; Lindberg, E.; Lang, M.; Arumae, T.; Peuhkurinen, J.; Sirparanta, S.; Pyankov, S. & Rautiainen, M. (2019). Seasonal dynamics of albedo across European boreal forests: Analysis of MODIS albedo and structural metrics from airborne LiDAR. Remote Sensing of Environment. 224:365-381.

- Rodriguez-Veiga, P.; Quegan, S.; Carreiras, J.; Persson, H.J.; Fransson, J.E.S.; Hoscilo, A.; Ziolkowski, D.; Sterenczak, K.; Lohberger, S.; Stängel, M.; Berninger, A.; Siegert, F.; Avitabile, V.; Herold, M.; Mermoz, S.; Bouvet, A.; Le Toan, T.; Carvalhais, N.; Santoro, M.; Cartus, O.; Rauste, Y.; Mathieu, R.; Asner, G.P.; Thiel, C.; Pathe, C.; Schmullius, C.; Seifert, F.M.; Tansey, K. & Balzter, H. (2019). Forest biomass retrieval approaches from earth observation in different biomes. International Journal of Applied Earth Observation and Geoinformation. 77:53-68.

- Santoro, M.; Cartus, O.; Fransson, J.E.S. & Wegmüller, U. (2019). Complementary of X-, C-, and L-band SAR Backscatter Observations to Retrieve Forest Stem Volume in Boreal Forest. Remote Sensing. 11(13).

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- Fransson, J.E.S.; Olsson, H.; Wallerman, J.; Persson, H.J.; Ulander, L.M.H; Eriksson, L.E.B.; Soja, M.J.; & Santoro, M. (2019). Retrieval of forest biomass and biomass change using PAL-SAR data. In: Final Report on the 4th ALOS-2 Research Announcement, Japan Aerospace Exploration Agency (JAXA), Earth Observation Research Center (EORC), NDX-2018023. pp. 685-695.

- Fransson, J.E.S. & Santoro, M. (2019). K&C Final Science Report – Phase 4, Retrieval of forest biomass and biomass change with spaceborne SAR. In: The ALOS Kyoto & Carbon Initiative, Science Team Reports, Phase 4 (2015-2019), Japan Aerospace Exploration Agency, Earth Observation Research Center, 2-1-1 Sengen, Tsukuba-shi, Ibaraki 305-8505, Japan, JAXA EORC, NDX-2019009. pp. 258-270.

- Olsson, H.; Heden, P.; Fröjdenlund, J. & André, P. (2019). Rapport geodatarådets handlingsplan 2018. Aktivitet 1d: Användarbehov inom de areella näringarnas ekosystem, en del av fokusområdet Användarbehov och samhällsnytta. Geodatarådet och Lantmäteriet. Dnr: LM 2019/001170.

Text:
Heather Reese.

Forest Inventory and Sampling

Forest inventory and sampling comprises general sampling theory, field-based forest and landscape inventory, and in relation to these activities modelling and development of inventory systems that utilize multiple data sources. Forest inventory currently includes a number of aspects relevant to sustainable forestry. In addition to data on trees and stands, information on biodiversity and greenhouse gas balances are included. The subject area contributes knowledge to a large number of applications within applied forestry and environmental monitoring and assessment.

Publications

Scientific Articles

- Appiah Mensah, A.; Akoto Sarfo, D. & Tetteh Partey S. (2019). Assessment of vegetation dynamics using remote sensing and GIS: A case of Bosomtwe Range Forest Reserve, Ghana. The Egyptian Journal of Remote Sensing and Space Sciences. 22(2):145-154.

- Baeten, L.; Bruelheide, H.; van der Plas, F.; Kambach, S.; Ratcliffe, S.; Jucker, T.; Allan, E.; Ampoorter, E.; Barbaro, L.; Bastias, C.C.; Bauhus, J.; Benavides, R.; Bonal, D.; Bouriaud, O.; Bussotti, F.; Carnol, M.; Castagneyrol, B.; Charbonnier, Y.; Checko, E.; Coomes, D.A.; Dahlgren, J. et al. (2019). Identifying the tree species compositions that maximize ecosystem functioning in European forests. Journal of Applied Ecology. 56(3):733-744.

- Dickson, M.M.; Grafström, A.; Giuliani, D. & Espa, G. (2019). Efficiency and feasibility of sampling schemes in establishment surveys. Mathematical Population Studies. 26(2):114-122.

- Gschwantner, T.; Alberdi, I.; Balazs, A.; Bauwens, S.; Bender, S.; Borota, D.; Bosela, M.; Bouriaud, O.; Canellas, I.; Donis, J.; Freudenschuss, A.; Herve, J.C.; Hladnik, D.; Jansons, J.; Kolozs, L.; Korhonen, K.T.; Kucera, M. Kulbokas, G.; Kuliesis, A.; Lanz, A.; Lejeune, P.; Lind, T. et al. (2019). Harmonisation of stem volume estimates in European National Forest Inventories. Annals of Forest Science. 76(1).

- Hou, Z.Y.; Mehtatalo, L.; McRoberts, R.E.; Ståhl, G.; Tokola, T.; Rana, P.; Siipilehto, J. & Xu, Q. (2019). Remote sensing-assisted data assimilation and simultaneous inference for forest inventory. Remote Sensing of Environment. 234:111431.

- Kambach, S.; Allan, E.; Bilodeau-Gauthier, S.; Coomes, D.A.; Haase, J.; Jucker, T.; Kunstler, G.; Muller, S.; Nock, C.; Paquette, A.; van der Plas, F.; Ratcliffe, S.; Roger, F.; Ruiz-Benito, P.; Scherer-Lorenzen, M.; Auge, H.; Bouriaud, O.; Castagneyrol, B.; Dahlgren, J. et al. (2019). How do trees respond to species mixing in experimental compared to observational studies? Ecology and Evolution. 9(19):11254-11265.

- Ogle, S.M.; Kurz, W.A.; Green, C.; Brandon, A.; Baldock, J.; Domke, G.; Herold, M.; Bernoux, M.; Chirinda, N.; de Ligt, R.; Federici, S.; Garcia-Apaza, E.; Grassi, G.; Gschwantner, T.; Hirata, Y.; Richard, H.; House, J.I.; Ishizuka, S.; Jonckheere, I.; Krisnawati, H.; Lehtonen, A.; Kinyanjui, M.J.; McConkey, B.; Næsset, E.; Niinistö, S.M.; Ometto, J.P.; Panichelli, L.; Paul, T.; Petersson, H.; Reddy, S. et al. (2019). Generic methodologies applicable to multiple land-use categories 2019 refinement to the 2006 IPCC guidelines for national greenhouse gas inventories. Volume 4(2); Agriculture, forestry and other land use, Intergovernmental Panel on Climate Change.

- Patterson, P.L.; Healey, S.P.; Ståhl, G.; Saarela, S.; Holm, S.; Andersen, H.E.; Dubayah, R.O.; Duncanson, L.; Hancock, S.; Armstod, J.; Kellner, J.R.; Cohen, W.B. & Yang, Z.Q. (2019). Statistical properties of hybrid estimators proposed for GEDI-NASA's global ecosystem dynamics investigation. Environmental Research Letters, 14(6):0655007.

- Petersson, L.K.; Milberg, P.; Bergstedt, J.; Dahlgren, J.; Felton, A.M.; Gotmark, F.; Salk, C. & Löf, M. (2019). Changing land use and increasing abundance of deer cause natural regeneration failure of oaks: Six decades of landscape-scale evidence. Forest Ecology and Management. 444:299-307.

- Qi, W.L.; Saarela, S.; Armston, J.; Ståhl, G. & Dubayah, R. (2019). Forest biomass estimation over three distinct forest types using TanDEM-X InSAR data and simulated GEDI lidar data. Remote Sensing of Environment, 232:111283.

- Reddy, S.; Panichelli, L.; Waterworth, R.M.; Federici, S.; Green, C.; Jonckheere, I.; Kahuri, S.; Kurz, W.A.; de Ligt, R.; Ometto, J.P.; Petersson, H.; Takahiro, E.; Paul, T.; Tullis, J.; Somogyi, Z.; Pandya, M.; Rocha, M.T. & Suzuki. K. (2019). Consistent representation of lands 2019 refinement to the 2006 IPCC guidelines for national greenhouse gas inventories. Volume 4(3); Agriculture, forestry and other land use, Intergovernmental Panel on Climate Change .

- Steidinger, B.S.; Crowther, T.W.; Liang, J.; Van Nuland, M.E.; Werner, G.D.A.; Reich, P.B.; Nabuurs, G.J.; De-Miguel, S.; Zhou, M.; Picard, N.; Herault, B.; Zhao, X.; Zhang, C.; Routh, D. & Peay, K.G. (2019). Climatic controls of decomposition drive the global biogeography of forest-tree symbioses. Nature, 569(7756):404.

- Tuomi, M.; Stark, S.; Hoset, K.S.; Vaisanen, M.; Oksanen, L.; Murguzur, F.J.A.; Tuomisto, H.; Dahlgren, J. & Brathen, K.A. (2019). Herbivore Effects on Ecosystem Process Rates in a Low-Productive System. Ecosystems. 22(4):827-843.

- Valinger, E., Kempe, G. & Fridman, J. (2019). Impacts on forest management and forest state in southern Sweden 10 years after the storm Gudrun. Forestry. 92(4):481-489.

- Vauhkonen, J.; Berger, A.; Gschwantner, T.; Schadauer, K.; Lejeune, P.; Perin, J.; Pitchugin, M.; Adolt, R.; Zeman, M.; Johannsen, V.K.; Kepfer-Rojas, S.; Sims, A.; Bastick, C.; Morneau, F.; Colin, A.; Bender, S.; Kovacsevics, P.; Solti, G.; Kolozs, L.; Nagy, D.; Nagy, K.; Twomey, M.; Redmond, J.; Gasparini, P.; Notarangelo, M.; Rizzo, M.; Makovskis, K.; Lazdins, A.; Lupikis, A.; Kulbokas, G.; Anton-Fernandez, C.; Rego, F.C.; Nunes, L.; Marin, G.; Calota, C.; Pantic, D.; Borota, D.; Roessiger, J.; Bosela, M.; Seben, V.; Skudnik, M.; Adame, P.; Alberdi, I.; Canellas, I.; Lind, T. et al. (2019). Harmonised projections of future forest resources in Europe. Annals of Forest Science. 76(3).

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- Fridman, J.; Wulff, S. & Dahlgren, J. (2019). Resultat från kontrolltaxering av Riksskogstaxeringens datainsamling 2012-2016. Sveriges lantbruksuniversitet, Institutionen för skoglig resurshushållning. Arbetsrapport/Sveriges lantbruksuniversitet, Institutionen för skoglig resurshushållning.

- Lundblad, M.; Petersson, H.; Karltun, E.; Wikberg, P.E. & Bolinder, M. (2019). KP-LULUCF. In: National Inventory Report of Sweden, Swedish EPA. pp. 457-483.

- Lundblad, M.; Petersson, H.; Karltun, E.; Wikberg, P.E. & Bolinder, M. (2019). Land use, land-use change and forestry (CRF sector 4). In: National Inventory Report of Sweden, Swedish EPA. pp. 348-385.

Subject Area Manager
Karin Öhman

Staff
Jeannette Eggers
Ola Eriksson
Hampus Holmström
Mathias Kristoferqvist
Johanna Lundström
Tomas Lämås
Ylva Melin
Eva-Maria Nordström
Dianne Staal Wästerlund
Rickard Westerlund
Erik Wilhelmsson

Doctoral Students
Mattias Danielsson
Patrik Ulvdal
Pär Wilhelmsson

Guest Researcher
Inci Çaglayan

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

Forest Planning

Forest planning shall provide knowledge and analysis tools that can contribute to the sustainable use of the forest resource with regard to economic, ecological and social values. Forest planning deals with planning issues from both a company perspective, and from a stakeholder or society perspective. The focus of research on the forest company deals basically with quantitative methods to translate owners' goals into a long-term forest plan. The society perspective is represented by providing long-term analysis on national and regional level, and on research on the forest landscape as a socio-ecological unit, where various stakeholders converge and work together to influence the landscape's development.

Publications

Scientific Articles

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Mathematical Statistics Applied to Forest Sciences

The application of mathematical and statistical methods in forest sciences is challenging due to the great amount of variations present in the nature, with complex dynamics that involve variations in both space and time, and a wide range of mathematical statistical methods are studied, developed, and applied, for collecting, analyzing, 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.

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Landscape Studies

Through an interdisciplinary approach, Landscape Studies conducts research on the utilization of landscapes, its multiple resources and users. Thereby we contribute to an increased understanding of the socio–ecological processes and their change in time and space. Of special interest are the connections between natural resource use, stewardship, ecosystem production and community development processes. Our work builds upon capacities within environmental monitoring, forest impact assessment, work science including gender studies, policy and rural development studies.

Publications

Scientific Articles

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Environmental Monitoring and Assessment

SLU is unique among Swedish universities with its strong focus on environmental monitoring and assessments (EMA). Within SLU, the Department is also quite unique with EMA as the dominating activity (roughly 60% 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. The inventories in the field, using remote sensing or by combining these two, are performed using area-based sampling designs adapted mainly to regional or larger scales. The idea is to carefully measure model variables on the sample units, and thus 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 estimate 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 programs, are also regarded as EMA.

Swedish National Forest Inventory

SLU is the responsible authority for the national official statistical area Forest Status 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. 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, where the statistics also can be downloaded in multiple formats including APIs.

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National Inventory of Landscapes in Sweden

The National Inventory of Landscapes in Sweden (NILS), funded by the Swedish Environmental Protection Agency, aims to monitor the status and trends in biodiversity and landscape structures in all types of terrestrial environments. Since 2019 focus has been on the mountain area. Field data are collected within 1 × 1 km squares using circular sample plots and line-intersect sampling.

Terrestrial Habitat Monitoring

The EU Habitats Directive can be seen as the foundation of the European Union's nature conservation policy. The aim of the directive is to protect habitats and species of European community interest and it states that every member state shall undertake surveillance of the conservation status of habitats and species. As a response, the program Terrestrial Habitat Monitoring (THUF) was initiated in 2006 with the aim of developing efficient methods for the monitoring and assessment of terrestrial habitats of high conservation status as well as for organizing necessary data collection, analysis and reporting.

Butterfly and Bumblebee Inventory

The Butterfly and Bumblebee Inventory (FHIN) is part of a nationwide long-term monitoring scheme of semi-natural grasslands assigned by the Swedish Board of Agriculture. The objective is to detect and report changes in biodiversity quality. In a sample of nearly 700 meadows and pastures we record species abundance and descriptive parameters by standardized transect walks.

Forest Sustainability Analysis

The program Forest Sustainability Analysis (SHa) 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 program, policy-makers, decision-makers and planners within a range of sectors in society, e.g. forestry, environment and energy, shall have access to expertise, analytical tools and support for decisions on issues related to forest development. The Heureka decision support system makes up a central tool in most of the SHa analyses.

Field Staff

Every year the Department organizes and implements extensive inventories of forests and landscapes in Sweden. To carry out this work a number of field workers are employed.

Swedish National Forest Inventory

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