

# *Goals and strategies for a sustainable future!*

SRH:s goals and strategies for research, education and  
environmental monitoring 2009-2012



SLU Department of Forest Resource Management

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**Dear colleagues,**

With combined efforts we have now formulated our future goals and strategies in our areas of research, education and environmental monitoring. These goals and strategies indicate the direction we shall follow as we move towards 2012!

This document provides an overview of our knowledge, competence and what we want to accomplish in the future. Together we have a unique and genuine expertise within SLU's three program branches. Our Department stands on three strong legs with an effective administration!

Our working situation gives us unique possibilities to create synergy effects - both between the program branches and the six competence areas at the Department: Remote sensing, Forest inventory and empirical ecosystem modeling, Forest planning, Forest technology, Forest in rural studies and International forestry. We want to actualize and develop these possibilities further in order to create an even stronger department.

The three letters in SRH can be connected to three keywords that describe our work: **S**uccessful, **R**esult-focused and providing **H**olistic solutions.

**Now we set our sights on the future!**



**JOHAN FRANSSON**  
Head of department



# *Goals and strategies for a sustainable future!*



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# Setting our sights on the future

Head of Department Johan Fransson

The document you're holding in your hand is our contribution to the Department, Faculty of Forest Sciences and SLU's accomplishment of reaching comprehensive goals and the strategies needed to realize them. These goals and strategies will be followed up annually in order to meet our goals by 2013, at which point there will be a thorough evaluation.

*Our vision: We lead in the advancement of knowledge and in the development of effective processes for the sustainable development of natural resources, are the sector's natural choice for co-operation and have a creative and inspiring working environment.*

Our primary goals can be summarized in eight points. We are committed to:

- conducting research within research groups with an international level of competence
- actively developing courses rooted in research and the needs of society
- supplying society with students educated at both the undergraduate, master's and doctoral level
- actively developing and guaranteeing the quality of our environmental monitoring programs
- strengthening the analysis operations within our environmental monitoring programs
- strengthening the synergies between program branches and between competence areas
- offering holistic solutions for the sustainable use of natural resources
- providing a stimulating and attractive working environment

## *Research*

Our goal within our competence areas is to carry out work of such quality and quantity that these individual competence areas can i) supply undergraduate, master's and doctoral levels of education with teachers and supervisors that have international research experience, ii) manage their own acquisition of competence in the form of merited researchers, iii) supply the sector with well educated personnel, and iv) actively participate in the development of the sector. Many of the research activities conducted in our competence areas have a clear problem-based orientation and the research groups make up a large national resource base. It is therefore important to maintain broad competence in each competence area. At the same time, it is also important to prioritize in order to preserve a high international competence within the research field.

## *Education*

Within both the undergraduate, master's and doctoral levels of education it is our goal to actively develop the range of courses in order to provide high quality education with relevant content and a clear progression. We strive for the undergraduate, master's and doctoral students to achieve the highest level of competence within our competence areas. We want the courses to be rooted in research and societal needs in order to supply society with attractive and professionally educated personnel.

## *Environmental monitoring*

The Environmental monitoring and assessment at the Department is undertaken at a substantial level and makes up a large part of SLU's work within this program branch. Our ambition is to actively develop and to guarantee quality of the environmental monitoring programs as well as to strengthen the analysis work in this area. There is great potential here to strengthen the synergies between environmental monitoring, research and education by co-operating and promoting the use of the collected and quality guaranteed data. Active analysis of the current situation is of high importance in order to continuously adapt the analysis work to different users' needs.

## *Holistic solutions and working environment*

Our ambition to develop effective activities within our work is done by promoting co-operation between the Department's sections, over department and faculty boundaries, as well as with the outside world. Through this co-operation we can offer holistic solutions for the sustainable use of natural resources and contribute to making our working environment stimulating and attractive.

## *Translating words into deeds!*

In order to accomplish our vision and to meet our goals in our daily work it's important to focus on what will be the most beneficial to our work. Words alone will not reach these goals. It is through constructive action in an open and positive spirit that we can achieve our goals. The journey to reach our goals is just as important as crossing the finishing line. This process now begins with forming and strengthening our operations, carried out with our sights set on the future. It is my hope and strong conviction that we will succeed. Now let's translate words into deeds!

# Remote Sensing

Competence Area Manager Håkan Olsson

## Description of the competence area

This competence area consists of research regarding remote sensing of forests and other terrestrial vegetation. Electro-optical (including digital cameras), radar and laser sensors are often used. The sensor platforms are usually satellites or airplanes, but small unmanned aircrafts (so-called UAV:s) or ground-based sensors can also be used.

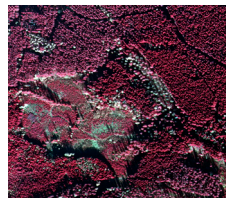
According to research traditions, remote sensing data are often processed together with field data in order to evaluate sensors, develop methods, or data products of relevance for forestry or nature protection. While a lot of the work within modern remote sensing research is done digitally, it also includes visual interpretation of remote sensing data, primarily aerial photography. This competence area also

maintains competence within Geographic Information Systems (GIS) which, e.g. leads to work with landscape visualization under different scenarios. Methods where prognoses are made by using existing data combined with newly acquired data may gain importance in the future.

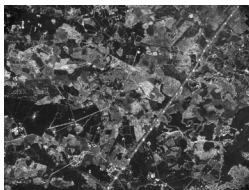
Remote Sensing activities are also related to the work done in Forest Inventory and Forest Planning. In addition, it borders on Forest Technology where remote sensing can provide information to be used by forest machine systems, and vice versa. Remote sensing has applications within ecological research as well, and knowledge about remote sensing is essential for establishing effective environmental monitoring systems.



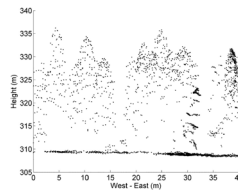
Ground based laser scanning



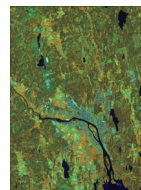
Aerial image



Radar data



Airbourne laser scanning



Satellite image



## Primary goals

Research of high scientific quality and relevance requires focusing on a few limited sub-areas. The competence area of Remote Sensing will be active in the following sub-areas:

- Development of methods for forest and other terrestrial vegetation mapping using satellite data, laser-scanning and digital aerial photos
- Use of dense laser scanning data and laser data from several time points
- Use of new types of radar data
- Inventory and remote sensing methods at single tree level
- Analysis of time series of remotely sensed data
- Data assimilation methods for forestry
- Support for remote sensing in developing countries
- Analysis and visualization of landscape development from historical to future time points

The competence area of Remote sensing will focus especially on:

- Conducting lead research concerning practical and useful methods for forest parameter estimation and vegetation mapping using remote sensing data from new types of sensors such as laser scanners, digital cameras and radar systems used combined with field data
- Taking methods into account that includes the increased availability of time series for satellite-borne sensors., The research group will also work towards spreading the results of their work in society
- Maintaining good contact with the international research community in the field as well as a broad spectrum of Swedish interests such as government authorities, businesses, research, groups, research foundations, and the general public

# Forest Inventory and Empirical Ecosystem Modeling

Competence Area Manager Göran Ståhl

## Description of the competence area

This competence area includes field-based forest and landscape inventory, as well as development of cost-effective inventory systems that use several different data sources. Previously forest inventory primarily focused on the trees and stands, but today it includes all aspects that are relevant for sustainable forestry, for example, indicators to describe biodiversity and greenhouse gas balances. The competence area includes development and application of infrastructure for making historical forest inventory data available for new analyses. Empirical ecosystem modeling implies development of models and functional connections for applications in forest inventory, forest planning and environmental monitoring. Some examples are models for determining wood volume, growth, biomass and carbon content. Forest inventory and empirical ecosystem modeling are important for a large number of applications within forestry and environmental work.

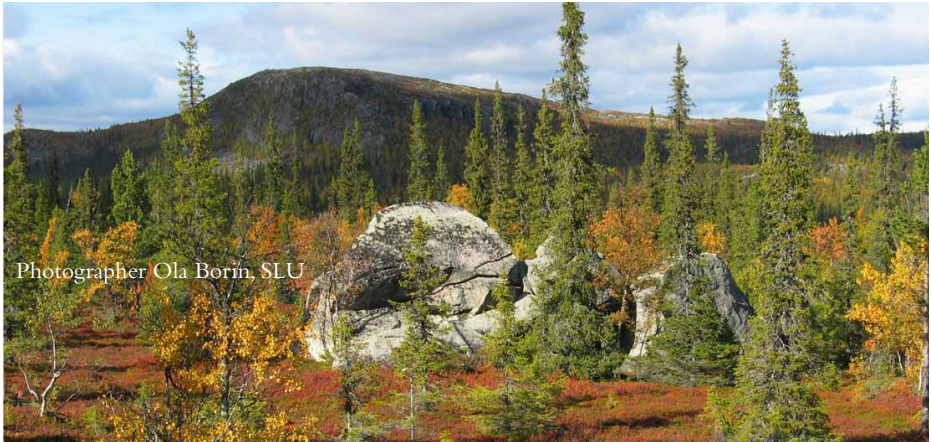
## Primary goals

Research of high scientific quality and relevance requires focusing on a few limited sub-areas. The competence area of Forest Inventory and Empirical Ecosystem Modeling will be active in the following sub-areas:

- Inventory aimed at sparse populations
- Inventory that uses several data sources for the development of cost-effective systems that take into consideration the information needed by decision makers
- Development and use of a research infrastructure for historical forest inventory data
- Development of empirical models, especially those that take risk and uncertainty into consideration, for application within forest inventory, forest planning and environmental analysis. A priority is models which support the reporting of greenhouse gas balances



Photographer: Ake Bruhn, SLU



The competence area of Forest Inventory and Empirical Ecosystem Modeling will focus especially on:

- Developing cost-effective inventory systems for practical forestry and environmental analysis
- Developing sought after model connections for Forest inventory and Forest planning
- Establishing infrastructure for research based on data from the National forest inventory

# Forest Planning

Competence Area Manager Ola Eriksson

## Description of the competence area

This competence area is focused on planning processes for different types of land owners. This means that we provide the forestry sector with methods and systems which can be used in practical applications for the sustainable use of forest with consideration to economy, natural values and social aspects. The central idea in this competence area is the planning process itself, decision support systems and methods for deriving solutions. The competence area is mainly focused on planning problems of a long-term nature. The development of the Heureka system exemplifies the type of work done towards this aim.

## Primary goals

Research of high scientific quality and relevance requires focusing on a few limited sub-areas. The competence area of Forest Planning will be active in the following sub-areas:

- Long-term planning, method development, for example, in landscape planning, harvest and silviculture planning and stand analysis
- Forest company planning processes
- Participatory planning and multiple-goal analysis
- Optimisation of risk problems
- Data quality and planning processes

The competence area of Forest Planning will focus especially on:

- Guaranteeing a critical mass within each sub-area
- Obtaining and maintaining an international reputation in relevant networks



ographer: Ola Borin, SLU

# Forest Technology

Competence Area Manager Iwan Wåsterlund

## Description of the competence area

This competence area is defined by the actions taken in forestry and how they are arranged and organized. The competence area is based on scientific theories and methods for studying forestry's work processes, technical help and facilities. This includes work methods, technology tools and people in form of labor to carry out these tasks. Consideration is taken to energy use, the work required, environmental effects, natural resource use and quality of the activities, as well as economy and working environment. The competence area of Forest Technology is concerned with forestry silvicultural activities as well as cutting and transporting of goods for both industrial forestry and private forestry. Forestry silvicultural

activities include, for example, ground preparation, planting and cleaning. Cutting includes thinning and final cutting. The resources produced include pulp wood, saw timber and bioenergy. Transportation requires the need to consider logistics as well as roads.

## Primary goals

Research of high scientific quality and relevance requires focus on a limited number of sub-areas. The competence area of Forest Technology aims to be active in the following sub-areas:

- Machines in forestry work
- People in forestry work
- System and logistics for the resource chain as well as for forestry roads





The competence area of Forest Technology will focus especially on:

- Developing theories and methods for energy-efficient and environmentally friendly technical solutions for the use of forest raw materials with well thought-out logistics
- Being an internationally important competence center for research and education in the forest technology sector
- Striving to be an attractive work place in the forestry sector

# Forest in Rural Studies

Competence Area Manager Gun Lidestav

## Description of the competence area

For this competence area the point of departure is based within the subject of forest resource management but has a focus on human-induced change processes with regards to their influence on rural communities. The focus is also on particular conditions and problems in relation to the use of the forests. The approach is interdisciplinary.

The competence area includes descriptions and analyses of the current state as well as changes occurring at both the local and landscape level, within the ecosystem and communities where sustainability is an important issue. This means that the connections between natural resource use, stewardship, ecosystem

production, and the thereby connected community development processes, are of special interest. The methods employed for data collection, analysis, and communication with the users are also of interest. In certain situations it is relevant to distinguish between a northern “first world” related dimension and a southern “third world” related dimension.

Our work is founded on competence in environmental monitoring, forestry consequence analysis and a tradition of national and international research that is both of an applied nature and with a problem-based orientation. This is complemented with studies of formal and informal institutions that contribute to our understanding of the use of natural resources.



Photographer: Ola Borin, SLU



## **Primary goals**

Research of high scientific quality and relevance requires focus on a limited number of sub-areas. The competence area of Forest in Rural Studies aims at being active in the following sub-areas:

- Analysis of development potential and structural limitations within family-run forestry
- Studies of public forests as an instrument of sustainable resource use
- Analysis of the mutual dependence between local resources and global situations

The competence area of Forest in Rural Studies will focus especially on:

- Developing theories and methods with which to analyze current status and change processes and their effects on local and landscape levels
- Being the clear choice as a partner for national and international researchers and actors within the field
- Contributing to the development in the larger field of research by participation in international networks, organizations and initiatives

# International Forestry

Competence Area Manager Mats Sandewall

## Description of the competence area

This competence area is shared among several departments at SLU. The part which is based at the Department of Forest Resource Management is derived from our competence areas of Remote Sensing, Forest Inventory, Forest Planning Forest in Rural Studies and Environmental Monitoring. Through the years research, education and development projects in developing countries of the world have been built up at the Department, where a more multi-faceted scientific perspective on the subject has evolved in pace with global development trends. It has given us comparative advantages regarding the description and analysis of status and changes in ecosystems and their application in a society and planning perspective where sustainable resource use is concerned. Other competence areas at the Department also have international applicability, but their emphasis is on Scandinavian conditions.

Through applications in developing regions and environments, International Forestry provides competence areas at the Department, especially Forest in Rural Studies with new and complementary research issues. A major part of the work in this competence area is organized together with Forest in Rural Studies and is seen as a part thereof.

## Primary goals

Research of high scientific quality and relevance requires focusing on a few limited sub-areas. The competence area of International Forestry will be active in the following sub-areas:

- The dynamics and changes in use of forest, land and natural resources, including its causes and effects in relation to society, natural environmental and human population
- Models and methods that describe trends in the use of forest and natural resources which are applicable in analysis, strategic planning and decisions on their sustainable use
- Techniques and methods for inventory and environmental monitoring which consider current and global needs

The competence area of International Forestry will focus especially on:

- Through dialog and cooperation with interested parties and research organizations, conduct developmentally relevant research and develop methods within the area of forest resource management. This will benefit societal development primarily in developing countries but also in Sweden



Photographer: Mats Sandewall, SLU

# Undergraduate and Master's Studies

Vice Head and Director Dag Fjeld

## Description of the program branch

The Department conducts bachelor and master's education primarily within SLU's Master of Forestry Program and participates in international cooperation with other universities and provides contract education to external customers. The course selection in the Forester program consists of over 40 ECTS credits at undergraduate level and 80 ECTS credits at master's level. The courses are given within six subjects: Remote Sensing and Geographical Information Technology, (GIT), Forest Inventory, Forest Planning, Forest Technology, Wood Supply and Organization and Leadership. The development of the Department's education is led by subject area coordinators.

The Department's involvement in individual courses and their level is presented per subject area below:

- **Remote Sensing and GIT** – GIT and Forest Planning AB, GIT II (D) and Forest Remote Sensing (D)
- **Forest Inventory** – Silviculture and inventory (AB)
- **Forest Planning** – GIT and Forest Planning (AB), Forest Plan Development (AB), Forest Planning from a Company Perspective (D) and Multiple-use Planning (D)
- **Forest Technology** – Forest Production and Processing (AB), Forest Technology (AB), Market-

Oriented Timber Supply (AB) and Advancing Forest Technology (E)

- **Wood Supply** – Forest Industry Supply Strategies (D), Operative Steering of Timber Delivery (D) and Business Processes and Information Systems in Timber Supply (E)
- **Organization and Leadership** – Individual and group leadership (A), Forestry Organizations' Development (C) and Project Work (C)

In addition to these courses, more than 20 master's theses per year are completed at the Department.

## Primary goals

The Department's primary goals for undergraduate education are to offer:

- Relevant competence for professional life
- High quality
- Positive evaluations

## Subject coordinator 2009

Jonas Bohlin (Remote Sensing and GIS)  
Sören Holm (Forest Inventory)  
Ola Eriksson (Forest Planning)  
Dag Fjeld (Forest Technology and Wood Supply)  
Dianne Staal Wåsterlund (Organization and Leadership)



Photographer: Julio Gonzales, SLU



Photographer Julio Gonzales, SLU

# Doctoral Studies

Vice Head and Director Hans Petersson

## Description of the program branch

The doctoral studies are first and foremost an education. It is of great importance that the Department educates PhDs or Licentiates with an internationally regarded high competence within the Department's own areas of competence. The concept is that the doctoral education at the Department should generate new researchers as well as PhDs or Licentiates dispersing up-to-date knowledge through teaching activities occurring at the Faculty and in the larger society. The aim of the education is also to produce researchers that will be experts and who are attractive to the international job market. The education also makes a major contribution to the Department's research in the form of scientific publications and dissertations.

The doctoral studies will prepare the student for research, leadership, teaching, and administration. A large part of the education will be customised for the individual. The Department strives to have a stimulating educational environment, a suitable range of courses, to initiate research schools, to have motivated and well educated advisors,

provide possibilities to create networks, and to actively support and follow up the research education. At the Department there are unique possibilities for the research students to use data gathered by the Department's own environmental monitoring programs.

## Primary goals

The Department's primary goals for doctoral studies are to:

- Provide a high class doctoral education that guarantees that after the exam, PhDs and Licentiates will have both broad subject knowledge as well as indepth specialized competence within their field
- Provide suitable examination of the research student's work to ascertain that they have the proper competence within their study area
- During the education, produce new knowledge through both publications and presentations of the student's own research



Photographer: Jenny Svernäs-Gillner, SLU



# Environmental Monitoring and Assessment

Vice Head Mats Nilsson

## Description of the program branch

SLU has a unique task as a Swedish university to carry out not only research and teaching, but to also conduct long-term environmental monitoring (referred to as Foma). This means that SLU should follow changes in the environment's condition, evaluate problems, and provide a basis of information for the sustainable use of natural resources. This information is delivered to the Swedish government and parliament, national and regional government authorities, businesses, and other interested organizations. The Swedish Environmental Protection Agency has assigned the Department the task of gathering information for the observation and follow up of the terrestrial habitat's condition and changes as well as the Species and Habitat directive via the programs National Inventory of Landscapes in Sweden (NILS) and Terrestrial Habitat Monitoring (THUF). SLU is responsible for official statistics given in the area *Forests' condition and changes* via the National Forest Inventory (NFI). In addition to these, there are also a number of smaller Foma projects at the Department.

The Department has a long tradition of work in environmental analysis, such as the work done by the NFI which was started already in 1923. Today the Department runs a wide array of environmental monitoring programs, accounting for approximately two-thirds of the total budget. One of the Department's strengths is the combination of research and environmental monitoring activities, leading to important synergistic effects. As an example, methods and models developed in research can be used

in environmental monitoring activities. At the same time, data collected by Foma programs provide a unique and valuable source of information for different research projects. Even the connection between Foma and the under-graduate and master's studies is important, as it spreads knowledge about Foma activities and the basis of information used to make decisions about the sustainable use of the country's natural resources.

The Department's Foma activities include data capture, analysis, reporting, and communication with the responsible agencies and customers both within and outside of SLU. An important part of the Environmental monitoring is a continual improvement of the methods and models used in order to improve the quality of the collected data, and to assure the quality of the whole process from data collection to finished product. Increased internationalization makes it all the more important to follow and actively take part in international development by taking part in conferences and national and international networks and projects.

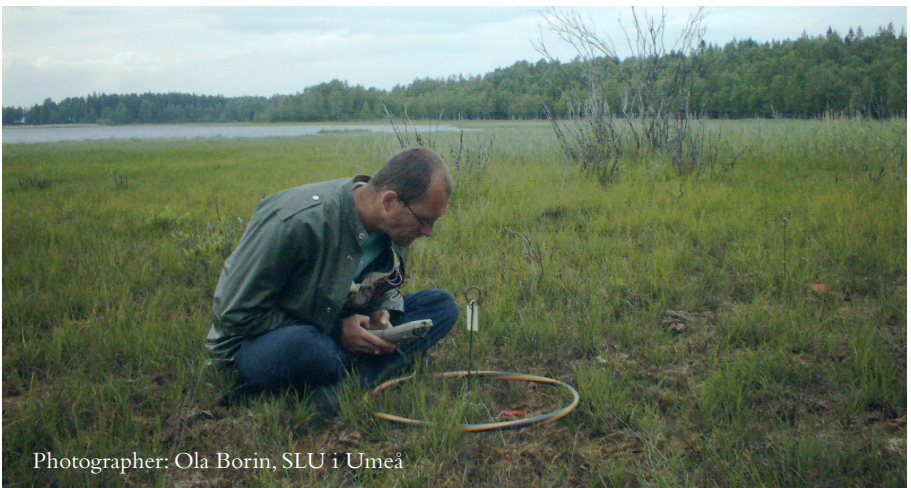
## Primary goals

- Through the Foma-programs and projects, being a well-known actor that continually collects and analyses information about the condition and changes in the environment, as well as communicating the findings and results to the larger community
- Developing, assuring the quality of and render the Foma programs and projects more effective
- Increasing the use of data generated by the Foma-programs





Photographer: Ola Borin, SLU i Umeå



Photographer: Ola Borin, SLU i Umeå

