

Potential Cooperation I: Silviculture

Research progress, potential content and channels of future cooperation

Dr.silv., Prof. **Jurgis Jansons**

Director of Latvian State Forest Research institute «Silava»

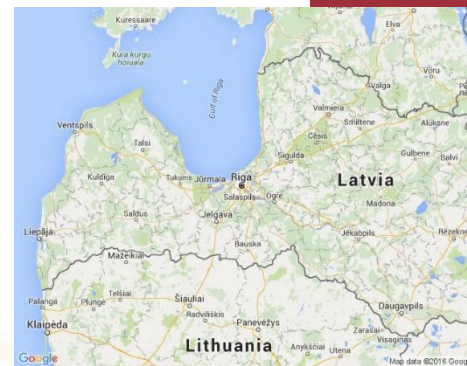
in cooperation with

Dr., Doc.**Marius Aleinikovas**, Director of Institute of Forestry, Lithuanian Research Centre for Agriculture and Forestry

Dr., Prof. **Henn Korjus**, Chair of Forest Management Planning and Wood Processing Technologies, Estonian University of Life Sciences

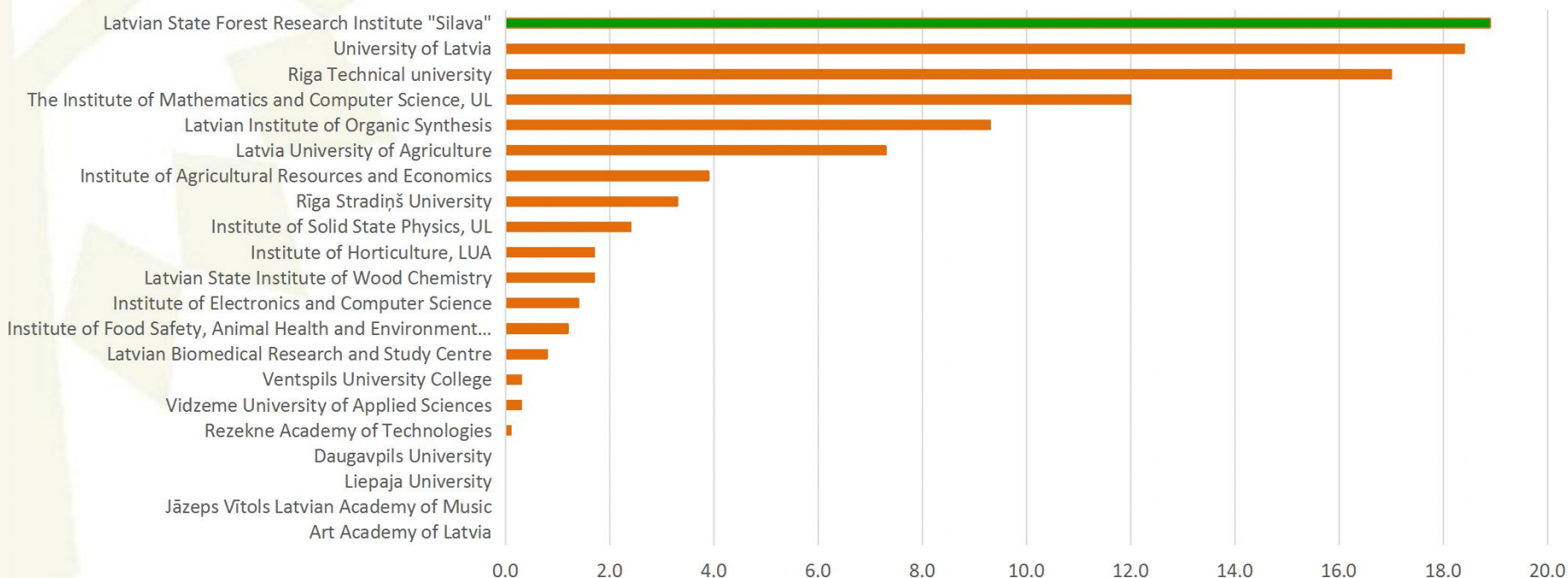
Latvia

- Fourth most forested country in Europe
- Forest area: 3,8 thousand ha (52% of territory)
- Total growing stock: 667 million m³
- Increase of forest area from the beginning of 20th century: from 27% to 52%
- Annual harvest volume: 12 mil.m³
- Annual net increment: 19,7 mil. m³



Latvian State Forest Research Institute «Silava»

- 2nd biggest research institute in Latvia, center of silviculture research
- 1st highest funding from business sector between Latvian scientific institutions in 2016
- Our revenue: 15% direct funding from state budget, the rest part – basing on tenders and different cooperation instruments
- Staff: total 156, incl. 98 – academic staff, 58 – science service, contractors and administrative staff



Distribution of Latvian research funding from business sector by institutions, %

LSFRI Silava scientific sectors

- **INCREASE OF FOREST CAPITAL VALUE**

- FOREST TREE BREEDING, GENETICS AND ADAPTATION
- FORESTRY AND FOREST RESOURCES
- FOREST BIOTIC RISKS (incl. Forest phytopathology; Forest entomology)
- IMPROVING TREE GROWTH CONDITIONS

- **INTERACTION OF FORESTRY AND THE ENVIRONMENT**

- TRANSFORMATION OF FOREST ECOSYSTEMS
- IMPACT OF FORESTRY ON FOREST, MARSH AND AQUATIC ECOSYSTEMS
- IMPACT OF ENVIRONMENTAL FACTORS ON FOREST ECOSYSTEMS
- FOREST DIVERSITY WITHIN HUMAN MANAGED ENVIRONMENTS IN LATVIA

- **NON-TIMBER FOREST SERVICES** (incl. FOREST ENERGY, CARBON SEQUESTRATION IN FOREST AND NON-FOREST ECOSYSTEMS, FOREST NON-WOOD PRODUCTS, FOREST SOCIAL FUNCTIONS AND VALUES)

- **WILDLIFE (HUNTING FAUNA) RESEARCH AND MANAGEMENT**

- **DEVELOPMENT OF FOREST MACHINERY AND TECHNOLOGIES**

- **AGROFORESTRY**

LSFRI Silava public delegated functions

- **GENETIC RESOURCE CENTRE**

- coordinates the maintaining, research and use of all Latvian genetic resources,
- incorporates the Latvian Gene Bank of cultivated plants, the Database and the Genetic Analysis laboratory, provides the information about the Latvian genetic resources of cultivated plants and animals
- provides the molecular passportisation of plant genetic resources collections

- **NATIONAL FOREST INVENTORY**

- Latvian National Forest Inventory
- EU Forest Inventory (levels I and II)
- Inventory of forest pathology and pests (biotic risks)

- **CALCULATION OF THE SINK OF SEG AND CO₂ IN THE SECTOR OF LAND USE, EXCHANGE OF LAND USE AND FOREST**

- **STATEMENT FOREST REPRODUCTIVE MATERIAL FROM OTHER COUNTRIES FOR THE AFFORESTATION AND FOREST REGENERATION IN LATVIA**

Lithuania

- Forest area: 2,2 thousand ha (34% of country territory)
- Coniferous stands cover 56% of the forest area, deciduous – 44%
- Total growing stock volume is 537 million m³
- Gross annual increment is 19.3 million m³
- Prepared merchantable round wood decreased by 10% and amounted 6.7 million m³ in 2015



Lithuania: Institute of Forestry

- Part of **Lithuanian Research Centre for Agriculture and Forestry**
- 77 employees and 16 PhD students
- **Research directions:**
 - (1) physical, chemical, biological soil properties and plant nutrition;
 - (2) forest plant breeding, genetics and biotechnology; new plant creation and research on Lithuania's forest plant gene pool;
 - (3) forest plants biology and modelling of silviculture systems for wood quality and stand productivity;
 - (4) microbiology and plant pathology, toxicology of forest products and materials;
 - (5) sustainability of forest ecosystems and climate change;
 - (6) forestry systems;
 - (7) the social and economics problems of forestry, forest policy.

Estonia

- Forest area: 2,313 thousand ha (53% of country territory)
- Coniferous stands cover 50% of the forest area, deciduous – 50%
- Net annual increment is 16 million m³
- Annual harvesting volume, 8.6 mill. m³ (average for 2007-2016)



Estonia

Forestry Research Institute of Forestry and Rural Engineering, Estonian University of Life Sciences located in Tartu is the only institution directly involved in forestry research in Estonia (<http://mi.emu.ee/en/>)

Other universities (University of Tartu, Tallinn University of Technology, Tallinn University) are also dealing with several specific aspects in forest research

Experience of Latvian practical forestry

Use of domestic tree species

Development of forest productiveness, health and quality



Introduction of foreign tree species and populations in Latvia **had not been** effective

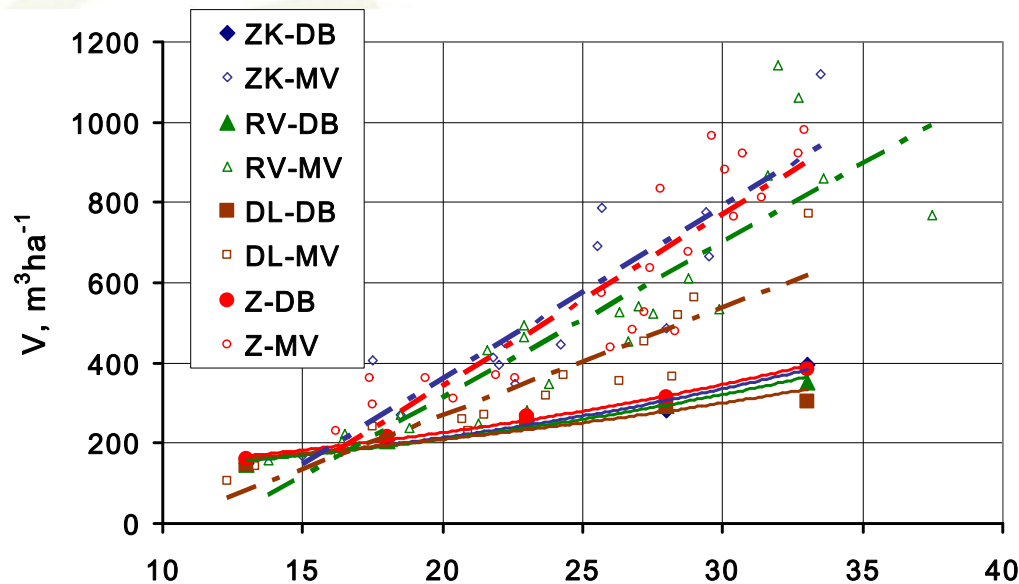
Breeding of Riga pine (*Pinus sylvestris* (L.) var. *rigenis*)

Experience of Latvian practical forestry (2)

Basic principles:

- System of small clear-cuts (aver. 2ha)
- Use selected forest reproductive material for afforestation
- Intensive cultivating of young forest (1500–2500 trees per ha)

Thin forest in youth', thick and productive – in old age

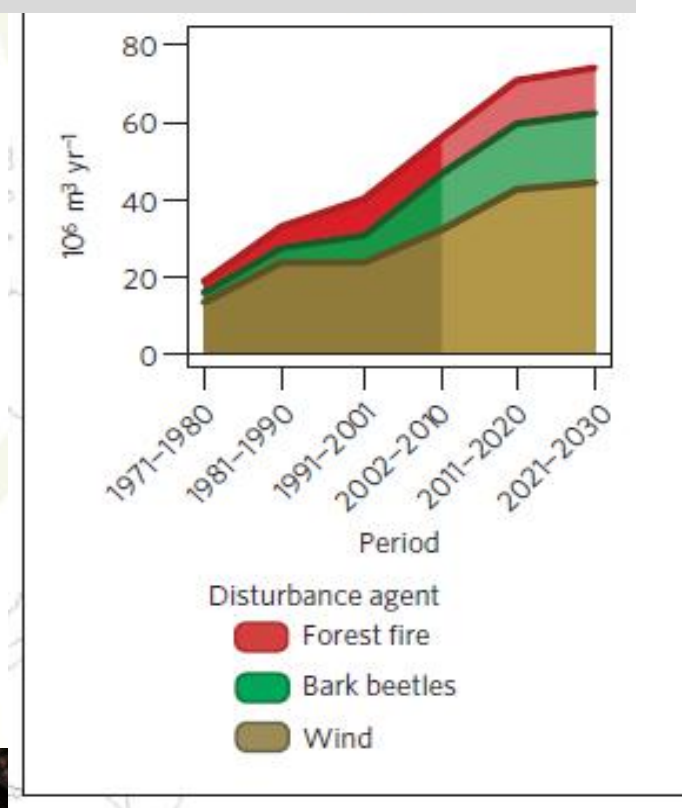


Growing stock of young stands: THIN vs. THICK:
Latvian experience



**What kind of international
cooperation could be offered
and developed
by our states of boreal and
hemiboreal forests?**

Disturbances: Europe



Expected climate change and role of forestry in mitigation

- Major factors affecting forest in Europe are forest fires, dendrophagous insects and wind (storms). Impact of all of these factors are expected to increase with the climatic changes.
- Occurrence of forest fires strongly correlates with the drought indices. It implies, that major emphasize in future needs to be placed on fire protection. Research areas in this aspect are: adaptation of more accurate fire prediction models, while assessing the correlations between different meteorological parameters and moisture content of forest litter and humus.
- Insect damages are expected to increase due to longer vegetation period and increase in temperature, affecting both the existing species and occurrence (migration) of new species.
- Cooperation in research of impact of such changes on different development phases of insects as well as in synchronicity between insect development phases and growth of their host organism could be of a mutual benefits. Development of early warning systems for insect outbreaks as well as potential biological control agents, currently considered too costly for a single country, is of practical importance.



Spatial assessment of storm damages, mechanistic tree resistance models

- Wind damages are expected to rise due to combination of more frequent storms and longer vegetation period – longer period without frozen soil as well as shorter leaf-less period for broadleaved trees.
- Cooperation in research can focus on spatial assessment of storm damages, revealing the potential silvicultural options for minimization of their amount as well as development of mechanistic tree resistance models for more accurate predictions of damage probabilities.
- Resilience of the forest stands and financial system of forest management is of particular importance in relation to studies of interactions between the impacting factors and their cumulative influence over time (rotation period).

Contacts:

Dr. Aris Jansons, senior researcher of LSFRI Silava
(aris.jansons@silava.lv)



Joint elaboration & implementation of climate change mitigation measures

- New ways for sustainable intensification of forest management to increase CO₂ removals (species selection, faster regeneration, thinning, drainage and fertilization).
- Afforestation of marginal and degraded farmlands.
- Climate friendly management of organic and drained mineral soils.
- Development of specialized forest machines for different conditions.
- Promotion and development of forest bioenergy and harvested wood products.



Contacts:

Dr. Andis Lazdins, senior researcher of LSFRI Silava
(andis.lazdins@silava.lv)

Elaboration of greenhouse gas accounting and projection methods

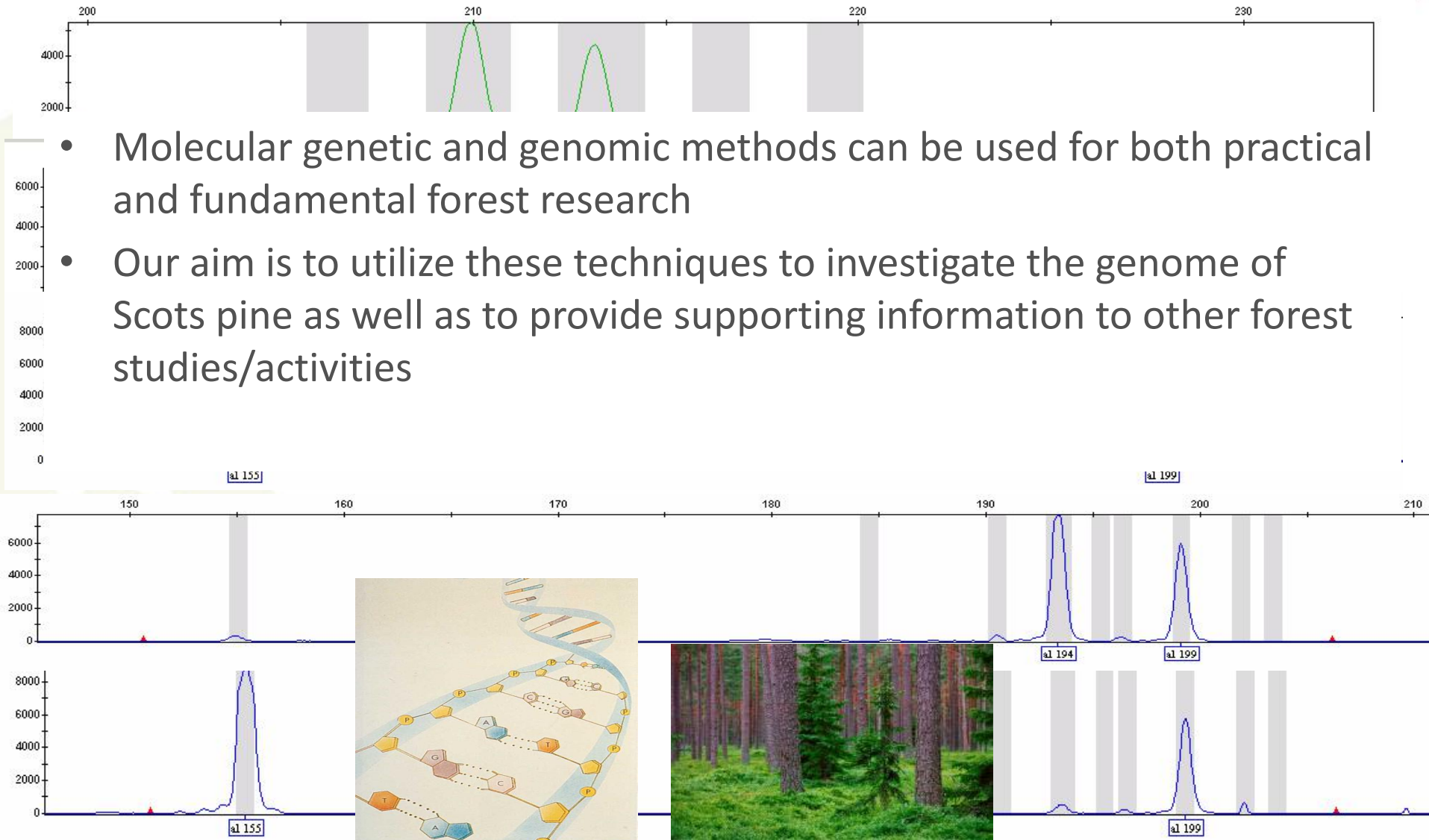
- Elaboration of factors and models for accounting & projection of soil GHG emissions.
- Development of satellite and LiDAR data based methods for estimation of land use, soil moisture and biomass stock.
- Elaboration of biomass expansion factors, as well as below- & above-ground litter carbon input data.
- Elaboration of life cycle assessment and modelling tools for land use analysis.



Contacts:
Dr. Andis Lazdins, senior researcher of LSFRI Silava
(andis.lazdins@silava.lv)

Forest genetics and genomics

- Molecular genetic and genomic methods can be used for both practical and fundamental forest research
- Our aim is to utilize these techniques to investigate the genome of Scots pine as well as to provide supporting information to other forest studies/activities



Forest genetics and genomics – research directions

- Genomic responses to stress and adaptation in Scots pine
- Tree breeding programs (clonal identification, genetic diversity, marker-assisted selection)
- Forest genetic resources (native species)
- Biodiversity monitoring (including impact of forest management practices and microorganisms)
- Phylogenetic and population analyses of wildlife species (wolf, lynx)

Contacts:

Dr. Dainis Rungis, senior researcher of LSFRI Silava
(dainis.rungis@silava.lv)

Forest management impact on forest and related ecosystem services

Mapping and assessment of ecosystem services provided by forests and related ecosystems (e.g., aquatic ecosystems, wetlands):

- Provisioning ecosystem services
 - Timber and energy wood supply;
 - Non-wood forest products supply (berries, mushrooms etc.)
- Regulating ecosystem services
 - Water quality;
 - Carbon sequestration;
 - Nutrient cycling;
 - Noise reduction etc.
- Cultural ecosystem services
 - Recreation;
 - Visual perception of landscape etc.

Contacts:

Dr. Zane Libiete, senior researcher
of LFRI Silava
(zane.libiete@silava.lv)

Forest management actions

- Forest logging, including intensified use of forest biomass (whole-tree harvesting, stump extraction);
- Forest infrastructure (drainage systems and road networks) maintenance and construction;
- Protecting measures, e.g., water protection structures (sedimentation ponds, riparian bufferzones), biodiversity protection measures – efficiency assessment.

Contacts:

Dr. Zane Libiete, senior researcher of LFRI Silava
(zane.libiete@silava.lv)

Results and outputs

- Knowledge on the impact of different forest management aspects on ecosystem service provision by forests and adjacent ecosystems;
- Tools to aid forest management planning and implementation, e.g., guidelines;
- Informing and education of forest owners and managers (demonstration areas, field courses).

Contacts:

Dr. Zane Libiete, senior researcher of LFRI Silava
(zane.libiete@silava.lv)



***THANK YOU FOR YOUR
ATTENTION!!***

