National research agenda 2007–2030

Russian forest-based sector

INTRODUCTION

Forest is the largest biome and a single country in Northern Eurasia – Russia – is holding 22 % of global and 38 % of the Eurasian forest resources (FAO 2001). Area of the Russian forests is about 776 million ha, wood volume is about 82 billion m^3 (106 m^3 /ha). Boreal and temperate forests amount altogether to about 50% of global boreal and temperate forests. Russian forest accounts for 30 % of raw materials in the world market. Russia holds 26 % of the world's pristine forests. The Russian forests play an important role in the global climate system, they are gigantic oxygen factory, global reservoir of the organic matter, powerful regulator of energy fluxes and water cycle. Forests are biotope for wild animals and a natural habitat environment for indigenous populations.

It is difficult to overestimate the role of forests as a source for many goods of vital importance for human society. In the long run, it will not be economically justifiable to manufacture other than higher value-added products. For sustainable development a more knowledge-based, more customer-focused and more innovation-oriented forest industry should be built.

The objectives of the National Research Agenda (NRA) of the Russian Forest-based Technological Platform are as follows:

- Promote the development of the Russian forest-based sector, including: sustainable forestry, pulp and paper industry, wood products, bio-energy, green chemicals and composites.
- Contribute to more efficient research and education and training in forest-based sector.
- Improve the level of innovation.

The Strategic Research Agenda (SRA) of the European Forest-based Technological Platform (FTP) had identified 26 priority research areas whereas the Russian NRA chose 19 of them as the most relevant to fit the Russian Forest-based sector issues.

Priority research areas in the Russian NRA referring to the SRA strategic objectives defined by the European FTP are as follows:

Strategic objective 1:
Development of innovative products for changing markets and customer needs

- 1-5: Building with wood.
- 1-6: Commercializing soft forest values.
- 1-7: Moving Europe with the help of bio-fuel.
- 1-8: Pulp, energy and chemicals from wood bio-refinery.
- 1-9: "Green" specialty chemicals.
- 1-10: New generation of composites.

Strategic objective 2:
Development of intelligent and efficient manufacturing processes, including reduced energy consumption

- 2-1: Reengineering the fibre-based value chain.
- 2-2: More performance from less inputs in paper products.
- 2-3: Reducing energy consumption in pulp and paper mills.
- 2-4: Advanced technologies for primary wood processing.
- 2-6: Technologies to boost heat and power output.

Strategic objective 3:
Enhancing availability and use of forest biomass for products and energy

- 3-1: Trees for the future.
- 3-2: "Tailor-made" wood supply.
- 3-3: Streamlined paper recycling.
- 3-4: Recycling of wood products – a new material resource.

Strategic objective 4:
Meeting the multifunctional demands on forest resources and their sustainable management

- 4-1: Forests for multiple needs.
- 4-2: Advancing knowledge on forest ecosystems.
- 4-3: Adapting forestry to climate changes.

Strategic objective 5:
The sector in a societal perspective

- 5-3: Citizens' perception.

FORESTRY

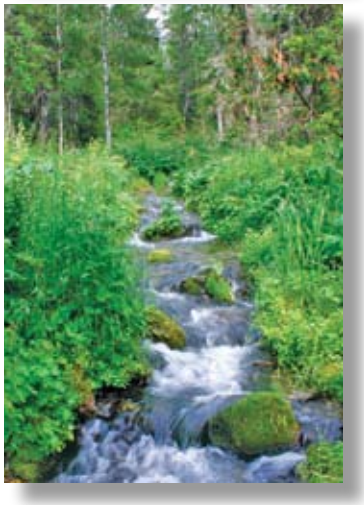
VISION

The key principle of the modern policy is the sustainable development of multi-functional forestry.

The Russian forest-based sector aims at sustainable forest management and multiple use of forests taking into consideration their global ecological significance, safeguarding biodiversity and forest ecosystem functions. The priority areas in NRA are development of forestry management systems adapted to local and regional conditions, and climate change, methodology of forest inventory, forest monitoring of current changes, national certification strategy to enhance the value of forest resources and services, commercializing soft forest values.

GOAL

Developing sustainable and multifunctional forestry.



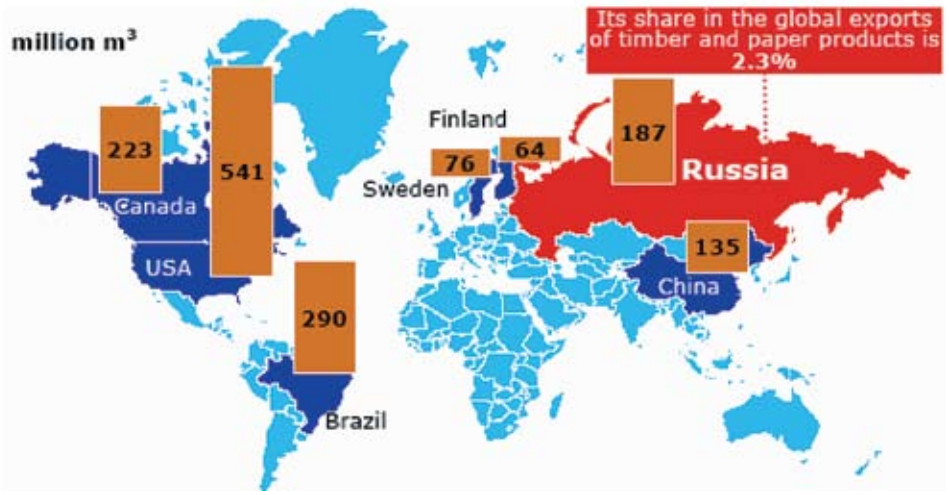
RESEARCH AREAS

- Forest ecosystem reactions to environmental changes.
- Forest biodiversity and ecosystem functions evaluation.
- Forests for multiple needs.
- Forest reproduction.
- Forest protection.
- Forest monitoring: ground-based and remote sensing methods.
- Adapting forestry to climate changes.
- Sustainable management of forest in the context of global changes.

WOOD PRODUCTS

VISION

Russian forest resources are under-used in wood products manufacturing due to a number of reasons, one of which is a deep institutional transformation of the wood-based sector of the economy which has not finished yet. Almost all wood products have a consumer demand far exceeding the possible supply and consequently a good economic environment for production development. The latter can easy be achieved in a modern technological and management background with the participation in international cooperation and attraction of foreign intellectual and financial investments.



Russia is a world fourth in wood harvesting now. Meanwhile its share in the world global exports of wood and paper products is only 2.3%. By the year 2030 this situation should be changed.

GOALS

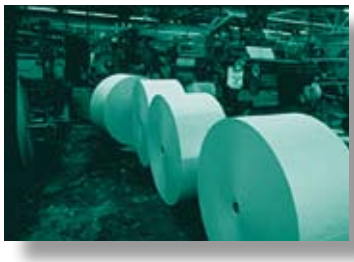
- Creation of technological, management and planning environment for faster development of wood processing industry.
- Diversification of wood products variety and rising their quality to make them more attractive for industry and private consumers.
- Facilities development for environmentally friendly and economically efficient complex use of the whole trees biomass including leafs and needles.

RESEARCH AREAS

- Research of the properties of larch wood and substantiation of processing technologies for manufacturing building elements and prefabricated wooden houses.
- Research of properties and substantiation of technologies for wood products from aspen.
- Substantiation of a continuous non-destructive quality monitoring in the building of wooden constructions.
- Development of technologies for surfaced OSB and surfaced MDF production.
- Modeling and optimization of sawing, heating and pressing operations.
- Optimization of power expenses in the woodworking enterprises using waste wood.
- Development of technology for manufacturing fuel pellets from specially prepared aspen wood.
- Widening of the range of prefabricated wooden houses for human wellbeing and welfare, especially for rural areas.

PULP & PAPER PRODUCTS

VISION



Pulp and paper industry is a basis for sustainable development of the entire Russian forest-based sector. Fast growth of the domestic market, competitiveness in the world market as a producer of northern reinforcing fibers and paper-board production on the basis of the virgin fibers are nowadays the characteristics of the Russian pulp and paper industry, based on the 1/4 of the world forest resources. The long-term lack of the new pulp and paper enterprises opens up new vistas for implementation of the innovation technologies in Russia.

GOAL

Creation and implementation of the innovative model of the Russian Pulp and Paper industry development.

RESEARCH AREAS

- Implementation of biorefinery concept: 1 – for the production of chemicals and bio-fuels alongside with pulp production; 2 – for different forest residues , bark and woody wastes of mechanical and chemical processing, not integrated in pulp production; 3 – for the stage by stage reconstruction of existing pulp and paper enterprises.
- Improvement of production structure for semi-manufactured fiber products with increased output of the knowledge-intensive products, widening the use of recycled materials (wastepaper) and mineral fillers in paper and cardboard production.
- Reduction of industrial loads of deep chemical wood processing to account for waste and by-products of the main manufacturing process converted to raw materials for other technological processes.
- Influence of environmental factors (natural disturbances, anthropogenic effects, climate change) on wood structure and its further processing.
- Energetic use of different forest residues and by-products from mechanical and chemical fiber processing.
- The use of woody raw material and its products for decontamination and recultivation purposes.
- Reduction of environmental impact of the pulp and paper mills.
- New generation of cellulose composites.
- Training Centre as part of a Network for Researchers and Technical Personnel of Universities and Enterprises of the Russian Pulp & Paper Industry and Forestry Complex.

BIOPRODUCTS – SPECIALTY CHEMICALS and COMPOSITES FROM FOREST- and HUMUS BASED BIOMASS

VISION

The forest-based sector has a key role in finding environmentally friendly solutions for manufacturing platform and specialty chemicals and composites. Bioproducts have a central role in restructuring the market of petrochemicals, in securing varied feedstocks for chemical industry, in increasing safety of the chemical products and minimizing dangerous wastes upon raw materials handling and processing.

STRATEGIC IMPORTANCE

Wood, wood waste, and humified materials provide for rich biogenic raw resources. Large quantities of different types of base or platform chemicals can be isolated or produced from wood, wood wastes, and organic rocks. Wood wastes include those produced during mechanical, chemical, enzymatic, thermal and other processing, including multitonnage pulping spent liquors and bioethanol production residues as well as different types of forest residues in bio-refineries. Humified mateials include peat, sapropel, leonardite, composts, activated sludge, and others. Upgrading the organic constituents of these materials to value-added specialty chemicals opens an opportunity for creating new types of forest-based value chains and development of market for products sustainable from economical, environmental and social aspects. This would significantly reduce society's dependence on oil-derived chemicals and materials.

GOAL

To develop innovative products from wood-, other plant-, and humified biomass, competitive on the future lead market of bioproducts.

RESEARCH AREAS

- Alternative feedstocks for chemical industry through combined treatment of wood, other plant, and humified biomass using biorefinery and chemical processing.
- Specialty chemicals from wood, other plant, and humified biomass.
- Composites from wood, other plant, and humified biomass.

BIOENERGY

VISION

Bioenergy is an important integral part of the modern principles of sustainable forest management. It is evident that Russian forests have a huge bioenergy potential. It comes from logging, sawing and woodworking waste, low-quality wood from sanitary logging etc. For example, the wood waste in the plywood industry is up to 60%. In today's Russia the bulk of this biomass is left in the forest, burnt or buried at disposal sites. Beside capital-intensive production of advanced construction materials, this wood waste should be used for energy: (1) energy production for the local purposes, implying CO_2 emissions reduction and (2) production of refined biofuels (pellets, briquettes, chips) for the open market, including export to EU countries. The general energy potential of the unused biomass in different value-chains of the Russian forest-based sector has never been subjected to a thorough systematic research; it is necessary to work out a development strategy for co-operation in this field. The key challenge of the research in bioenergy potential is to investigate the limit and availability of wood waste and non-industrial wood for biofuel production and the potential of CO_2 reduction in the framework of fuel-switch projects from oil and coal to biofuel.

GOAL

Search and selection of strategic approaches to bio-energy development.

RESEARCH AREAS

- Production of solid, liquid and gaseous biofuel.
- Energy as a result of wood biorefinery.
- Technologies for significant increase of heat and power output.

EDUCATION AND TRAINING

VISION

Skills and knowledge is the basis for the strengthening the competitiveness of the forest-based sector and contributing to the improvement in the quality of life of modern citizens. R&D are the main instruments to achieve these strategic goals. Increasing demand in continuing education in all sectors of economy in conditions of the fast growth is one of the most important and challenging goals of current EU and Russian policy. For the intensification of forest information exchange and research for sustainable forest management in Russia, the Moscow State Forest University will establish a regional support network in Russia.

This center will be a foundation for coordinating the activities of the higher education institutions, scientists and teachers, the representatives of business, and state institutions and organizations to assure quality and development of the higher vocational education, as well as to forecast the promising directions and develop scientific and methodological support for training the specialists in forest science, engineering and technologies. In addition, it will serve to open up the huge wealth of information and experience to the wider world and increase partnerships with other countries and international organizations in this field.

GOALS

- Providing the conditions to meet the demands of citizens, society and a labour market with high quality education.
- Integration into a uniform European scientific and educational space.
- Developing the system of continuous education in Russia in close connection with the market demand.

MAIN AREAS

- Research and development in close cooperation with the business sector.
- Working out proposals for the structure and scope of the main educational programs for advanced vocational education in the field of forest-based sector, certifying the educational process.
- Prosperous, new and significant business area based on the highest level of R&D knowledge.
- Development and demonstration of processes for continuous learning and training.
- Development and demonstration of technologies for producing special courses.
- Development and demonstration of the required new distribution infrastructure for stakeholders.

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