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FOREST PRODUCTS RESEARCHES IN THE WORLD: FROM LJUBLJANA UP TO SALT LAKE CITY

Valentin Shalaev
Moscow State Forest University, Russia
e-mail: shalaev@mgul.ac.ru

ABSTRACT

The International Union of Forest Research Organizations (IUFRO) is well known all over the world. It is the oldest and largest organization, which combines forces for about 15 thousand scientists from different countries and regions. The Fifth Division „Forest Products" is rather significant among IUFRO nine Divisions. This paper examines the scientific directions of the researches, which are the closest to Fifth Division in IUFRO „Forest Product". They are: the report „Future research in forest products" by Walter Liese at the XVIII IUFRO World Congress in 1986 in Ljubljana and the report „Forest Products Research in IUFRO: History and Future in Meeting's Needs" by Robert Youngs and John Youngquist at the XXI IUFRO World Congress in 2000 in Malaysia. The wide range of active performing 32 working and special research groups reflects the totality of scientific researches made by leading scientists of the international scientist community working on the subject. The agenda of the XXIV IUFRO World Congress (Salt Lake City, USA) and Strategy on 2015-2019 „Intrerconnecting forests, science and people" emphasizes the significance of this research trend in forest products and in the most general form it determines the dynamics of their development.

Key words: IUFRO, Forest Researches, Forest Products, Directions.

The analysis of the scientific directions of forest researches in the world has been established by the XXII IUFRO World Congress in 2005 in Australia that the main directions of researches had diverted from technical to environmental problems [1–2]. This fact was confirmed in 2010 during XXIII IUFRO World Congress in Seoul [3]. Since that time we see redoubling attention to social issues. The scientific program of the XXIV IUFRO World Congress which was held in October 2014 in Salt Lake City, USA included the following research themes [4]:

1. Forests for People;
2. Forests and Climate Change;
3. Forests and Forest Products for a Greener Future;
4. Biodiversity, Ecosystem Services and Biological Invasions;
5. Forest, Soil and Water Interactions.

This Congress confirmed the tendency towards globalization in scientific fields, increase in activity in social ecological avenues of research.

So we would like to stress and clarify the scientific direction which is very close to IUFRO Division 5th „Forest Products", one of nine IUFRO Divisions Professor Walter Liese made a report "Future research in forest products", in 1986 during 18th IUFRO World Congress there he gave a detailed description [5]. He identified a number of future research directions, including

- Demand and Supply;
- Fast growing plantations;
- Lesser Known Species;
- Primary Species;
- Timber for Construction;
- Residues;
- Adhesives;
- Wood Preservation;

- Chemical Utilization;
- Other Ligno-Cellulose Resources;
- Information and Transformation;
- Interdisciplinary Approach;
- Declining Resources for Forest Products Research.

In 2000 during XXI IUFRO World Congress in Malaysia professor Robert L. Youngs and John A. Youngquist (former chiefs of 5th IUFRO Division) presented a report "Forest Products Research in IUFRO: History and Future in Meeting Society's Needs" [6], where they gave the estimation and evaluation of research directions:

- New knowledge of wood quality factors;
- New approaches to the efficient use of wood as an engineering material;
- Effective processing methods to deal with the growing diversity of resources, processing conditions, and product needs;
- Effective, environmentally friendly methods of wood protection;
- New concepts related to composites of wood and other materials;
- Methods for dealing with the growing trade in tropical woods;
- More efficient use of wood for energy;
- Better understanding of non-wood products, their sources, and their derivatives;
- Improved use of bamboo and rattan;
- New advances in growth ring analysis;
- Broader understanding of marketing techniques to effectively match products to consumer needs.

In the frame of 5th IUFRO Division there are 32 work groups and special groups. This range reflects the set of scientific researches on the international community who is working on this subjects [7]. The majority of them meets the topics which were announced by W. Liese in 1986 and by R. L. Youngs and J. A. Youngquist in 2000, however the new areas have appeared and they reflect the current status and some prospects. So they are:

- Wood quality;
- Wood quality modelling;
- Tree ring analysis;
- Understanding wood variability;
- Physiomechanical properties of wood and wood based materials;
- Non-destructive evaluation of wood and wood-based materials;
- Fundamental properties of wood and wood-based materials;
- Wood protection;
- Biological resistance of wood;
- Wood protection for quarantine, food packing and trade in wood;
- Wood protection under tropical environments;
- Protection of cultural artefacts;
- Protection by surfacing and finishing;
- Wood processing;
- Wood drying;
- Adhesives and gluing;
- Sawing, milling and machining;
- Industrial engineering, operations analysis and logistics;
- Composite and reconstituted products;
- Properties and utilization of plantation wood;
- Utilization of dry area timber;
- Utilization of planted teak;
- Utilization of planted eucalypts;
- Energy and chemicals from forest biomass;
- Forest products marketing and business management;
- Wood culture;
- Non-wood forest products;
- Medicinal forest products;

- Edible forest products;
- Bamboo and rattan;
- Sustainable utilization of forest products;
- Forest products education.

The comparison of forecasts from 1986 and 2000 and current set of research directions of working and special groups under 5th IUFRO Division shows a quite accurate conformity in the main part. It is necessary to emphasize the certain development and expanding of the areas in this direction. There is also a socio-ecological trend, which, however, corresponds to the general correction of forest research areas in the world. On the one hand, in framework of the fifth IUFRO Division „Forest Products" the new research groups have appeared, they were not famous before. These researches are closely connected to non-wood, medical and edible forest products, bamboo and rattan (that means the increasing interest for multiple use forest); education in the field of forest products; wood culture (a new and very interesting direction).

On the other hand, the new group-directions of interest such as «Energy and chemicals from forest biomass», «Sustainable use of forest products», «Composite and recovered materials and products» have been created. It is very important to stress that they are meeting the general trends in the development of society.

The IUFRO All-Division 5 International Conference was recently held in Portugal (July 2012), where more than 500 scientists reports from more than 60 countries were presented, this fact confirmed these trends once again. It was stressed by these plenary reports: Eduardo Rojas-Briales "Global and European Challenges of Forests Moving towards Green Economies" (FAO), John N. Saddler and Sergios Karatzos "The Biorefining Story: Progress in the Evolution of the Forest Products Industry to a Forest-Based Biorefining Sector" (Canada), Klaus Richter „Wood in construction – including multi-storey building" (Germany), Madhav B. Karki „Enhancing the contribution of nontimber forest products in supporting green economy and sustainable development in mountain countries" (Nepal), Richard Vlosky "Competing in the Global Economic Recession" (USA), IAWS Academy Lecture Lennart Salmen "The wood fibre structure – how can it be utilized?" (Sweden), J.L. Colodette „The Brazilian forestry industry: focusing on eucalypt" (Brazil), Helena Pereira „The importance of biomass structure and chemical composition for biorefineries" (Portugal) [8].

Without dwelling on the merits and benefits of forest products, primarily the possibility of reproduction, we should note that the population growth (it is fatally under existing conditions) will really lead to serious increase in consumption of forest products. The thesis of sustainable development (now we consume 1.5 times more resources than the Earth is able to provide), the thesis of „green" economy determine the necessity and the expediency to the corresponding increase in the production of forest products, while maintaining the total forest area. That is why the development of different areas of research in this case is very important and forward-looking.

It is very indicative the dates which are presented in Chapter 4 „Wood and wood products" from Report of the World Wildlife Fund (WWF) „Living forests" [9]. These are conditions for transformation "…the manufacturing sector in the timber sector of the economy, positively affecting the planet health:

- **improving forest management** (e.g., providing legal and sustainable forest management, forest planning effective zoning based on a

landscape approach, improving the sustainability of forest plantations, the introduction of responsible purchasing policies);

- **improvement of technologies** (e.g., more efficient use of raw materials and recycling efficiency, the development and introduction of new wood-based materials with a smaller ecological footprint);
- **improvement in management (e.g.,** strengthening social safety nets, more effective implementation of policies and practices);
- **improvement of policies** (for example, the creation of incentives for reducing the rate of forest lands in the land for other purposes, and unsustainable forest management by implementing public policies that support responsible forest management, which provides a more efficient carbon sequestration, biodiversity and water resources);
- **improvement of scientific information database** (for example, the implementation of long-term environmental impact studies of different approaches forestry in natural forests and creation managed plantations);
- **sustainable consumption** (e.g., the development of reusable timber, the new psychology and consumption strategy that would fit the needs of the poor and excluded to irrational and excessive consumption of the rich, which fully applies to wood products, and to food and energy as well as to all the resources and products where land and water are needed) ...".

So IUFRO 2015-1019 Strategy „Interconnecting forests, science and people" sets out five research Themes with associated emphasis areas which are underpinned by three Institutional Goals [4, 7]. The three Institutional Goals adapted from the previous Strategy present IUFRO's commitment to research excellence and interdisciplinary cooperation, to better visibility of IUFRO's knowledge products and network cooperation, and to science-based solutions and options for impact on policy processes:

Goal 1. Research Excellence: Strive for quality, relevance and synergies;

Goal 2. Network Cooperation: Increase communication, visibility and outreach;

Goal 3. Policy Impact: Provide analysis, insights and options.

The following five Themes aim to guide the science collaboration within IUFRO's global network in the forthcoming period:

1. Forests for People;
2. Forests and Climate Change;
3. **Forests and Forest Products for a Greener Future;**
4. Biodiversity, Ecosystem Services and Biological Invasions;
5. Forest, Soil and Water Interactions.

The 3rd Theme should be pointed especially, which reflects this. The Theme includes 3 parts.

Problem statement

With one-third of the Earth's land mass covered in forests, our forests and the renewable products they produce will play a critical role in the future welfare of the world's population. More than a quarter of the Earth's population depend on forests for their livelihoods and for a majority of the global population woody biomass constitutes the main fuel for cooking and heating. Yet forests must also provide freshwater, clean air, biodiversity, carbon storage, and many other ecosystem services. Consequently, demand for forest products is increasing as population

grows, but so is demand for the ecosystem services provided by forests.

Justification

Although the critical role that forests play in the welfare of the Earth's population is well-recognized, how forests can meet future needs while continuing in their existing role is poorly understood. We know that forests could play an increasing role in the sustainability of the global economy, greater roles in regional and local economies and in the welfare of people, and a key role in the emerging bio-based economy, but meeting these demands without compromising the ability of forests to meet individual requirements is a serious interdisciplinary challenge facing the forest research community.

Emphasis areas

1. Discovering new forest products and services – bioenergy, biomaterials, non-wood products, environment and human well-being

Although the development of new products from forest raw materials has in recent years focused on biofuels and bioenergy, other products are also emerging as important, such as new ways of using wood in construction, and wood-based bio-materials including bio-chemicals, bio-plastics and food additives. Moreover, the diverse services forests provide for the environment and human well-being have been increasingly recognized. These new forest products and services need to be researched and valued for their contribution to the future.

2. Optimal use of forest raw materials

It is important to maximize the economic, social, and environmental benefits of using forest products while ensuring their sustainability and contribution to a greener future. Are forest products really more sustainable than other competing products (e.g., concrete, steel, hemp, cotton), especially when a holistic approach to environmental impact and life cycle analysis is adopted?

3. Contribution of forests and their ecosystem services to traditional GDP and the Green/Bio-Based Economy

Forests, and the services they provide, are repeatedly and consistently under-valued, resulting amongst other things in deforestation and forest degradation. Given that the world's economic system is not going to change in the near-term, can we devise valuation systems consistent with current economic systems that recognize the true value of forests, especially in relation to competing products?

The Strategy pointed the importance of researches in forest products by these principles avenues and determine the tasks for the future movement and development.

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