

## FOREST PRODUCTS RESEARCH IN IUFRO: HISTORY AND POTENTIAL

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**[ABSTRACT]** When silviculture researchers in central Europe were gathering together to form IUFRO in 1892, forest products researchers were occupied with making useful forest products and conserving the forest resource through wise use. Forest products researchers did not become an active part of IUFRO until 50 years later. Research in forest products was stimulated by World War I and II—wood was essential for airplanes, ships, packaging, construction, and derived products. As World War II drew to a close, the newly established United Nations provided a forum for bringing together efforts that would encourage world stability and peaceful development. Utilization of forest resources was an important element in this effort, and those involved in this area found common ground. Initial efforts were focused on mechanical conversion of wood, but wood quality, wood chemistry, and wood protection soon captured the attention of researchers.

Meanwhile, IUFRO had been growing in both size and scope. The organization recognized the need to include the effective utilization of forest products, together with other aspects of forestry, as a key element in ensuring that forests could meet the increasing demands of society. Thus, forest products research was incorporated as Section 41 of IUFRO at the XI Congress in Rome in 1953. This program was greatly expanded at the XIII IUFRO Congress in Vienna in 1961.

The rapid growth in size and scope of IUFRO during the next decade led to a complete reorganization, which was formalized at the XV Congress in Gainesville, Florida in 1971. From this arose Division 5, which included subject groups on wood quality, wood engineering, wood protection, and wood processing, each with several specialized working parties, and a project group on properties and utilization of tropical woods. All of these reflected the increasing scientific and technical needs for wise use of the forest resource in both domestic and international industry and the increasing trade in forest products from the tropics as well the industrialized world.

Since that time, the program of Division 5 has broadened to recognize new needs for research on forest products as scientists in various parts of the world have sought a forum for sharing ideas, notes, and accomplishments. The results have been many: (1) new knowledge of wood quality factors, (2) new approaches to the efficient use of wood as an engineering material, (3) effective processing methods to deal with the growing diversity

of resources, processing conditions, and product needs, (4) effective, environmentally friendly methods of wood protection, (5) new concepts related to composites of wood and other materials, (6) methods for dealing with the growing trade in tropical woods, (7) more efficient use of wood for energy, (8) better understanding of non-wood products, their sources, and their derivatives, (9) improved use of bamboo and rattan, (10) new advances in growth ring analysis, (11) broader understanding of marketing techniques to effectively match products to consumer needs, and (12) sustainable forest development and its interdependence with the environment, economies of the world, and the varying needs of people for products of the forest.

We face new challenges as we consider the future of forest products research in IUFRO. No major problems are purely technical and disciplinary—they are social, economic, psychological, and traditional. Here are some points we should consider as we plan for what will be reported at the XXII Congress and beyond: (1) Develop depth and disciplinary strength within our groups and working parties, aggressively joining with others in this and other Divisions to focus on solutions to problems; (2) actively plan joint efforts with specialists from different fields to identify and solve forest-related problems. (3) Develop planning and management techniques that are uniquely adapted to voluntary organizations; and (4) Strengthen channels for communication and for transmitting and discussing information—

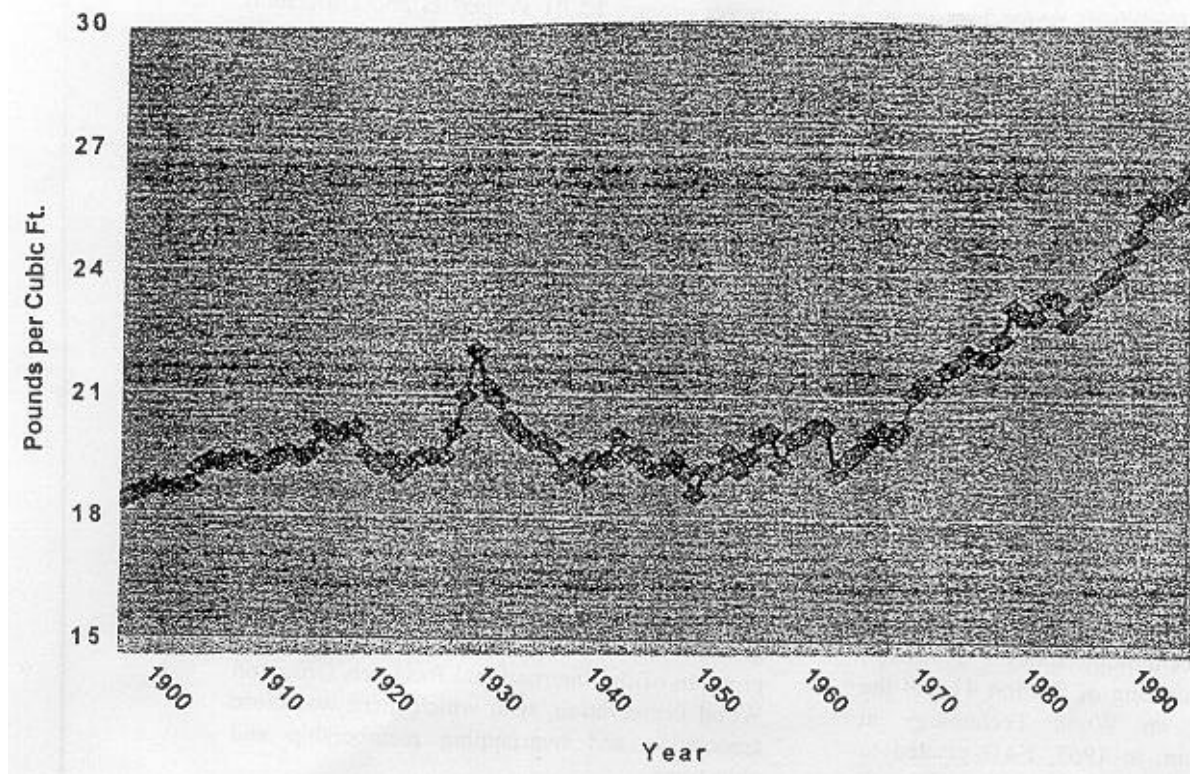
## INTRODUCTION

As awareness of the importance of the world's forest resources to human society and the natural environment grew during the 19th century, forestry researchers intensified their efforts to find ways to conserve that resource. Toward the end of the century, foresters from several research stations in Europe began meeting and corresponding to compare notes on research techniques and standards. Those informal contacts led to the establishment at Eberswalde, Germany, in 1892 of the International Union of Forestry Research Organizations (IUFRO). Today IUFRO is a union of over 700 research organizations worldwide and has a research scope much broader than those early foresters could conceive. Division 5 (Forest Products) of IUFRO is one of eight such divisions and is an integral part of the international approach to cooperative research on the management and preservation of the world's forest resources. It was not always thus. This paper is designed to

review its origins, its history, its current status, and its future opportunities and potential.

George Noel Gordon, Lord Byron, one of our most respected and quoted writers of two centuries ago, in his epic work *Don Juan* says "All human history attests that happiness for man - the hungry sinner! since Eve ate apples, much depends on dinner." We have learned that forest products provide the pay off - the dinner - that is both incentive and energy for forestry and that research in forest products is basic to that essential function. Figure 1 provides a good example of how research in wood science and technology in the 20th century has provided major benefits to mankind.[1]. As the world's appetite for wood products increases, research on all aspects of forest products will play an even more important role in the future. In turn, the role of IUFRO will increase substantially as teams of specialists from many disciplines are assembled to identify and solve major research issues and problems.

**U.S. Industrial Wood Product Output per Cubic Foot of Industrial Roundwood Input, 1900 - 1997 (P. Ince, FPL).**



**Figure 1**

### **UNITED NATIONS**

While silviculturists in central Europe were beginning to gather to compare notes on procedures and analytical techniques, researchers in forest products were also working in many parts of the world to face up to the growing awareness that the forest resource was not limitless and needed to be conserved and used wisely. They were finding ways to improve the economics of wood use as an engineering and raw material. This applied to construction, to tool making, to transportation, to packaging, to derivation of chemical products, and to many other applications. The research was accelerated early in the 20<sup>th</sup> Century and into the middle of the century by the heavy demand for efficient wood use both in the general economy and in two world wars, as well as in other wars that raged in the world. At the end of the second World War the establishment of the United Nations provided a forum for bringing together efforts that would encourage world stability and peaceful development. The high degree of significance given to effective utilization of forest resources provided a common ground for scientists in many parts of the world.

The Food and Agriculture Organization (FAO) of the United Nations included a Forestry and Forest Products Division, which set up technical committees in 1947. Among these was a subcommittee on wood chemistry, with members from at least ten countries. This group broadened its consideration to other aspects of wood utilization as well. Interestingly, this group, like the small group of foresters who formed IUFRO, concerned itself with standardization of terminology, methods of testing, and specifications for international collaboration. Meetings in New York; Appleton, Wisconsin; and Geneva, Switzerland helped the group share scientific concerns and progress. [2].

A United Nations Scientific Conference on the Conservation and Utilization of Resources met at Lake Success, New York, in 1949. In its forest resources section it dealt with seven areas of forestry, two of which were (1) logging and sawmill techniques and (2) preservation and chemical utilization of wood. Participants included several who were later active in IUFRO such as Alfred Stamm, Fred Simmons, and Edward G. Loche. [3].

research in the UN related activity were urged to bring together forest products researchers under IUFRO. This was begun at the XI IUFRO Congress in Rome in 1953 as Section 41, Mechanical Conversion of Wood. Papers were presented on basic aspects of ring width/wood quality relations and physical properties of wood [4].

At the Seattle World Forestry Congress, leaders of Section 41 were encouraged to broaden and strengthen the work of the section in response to increasing needs for forest products research. Consequently, at the XIII IUFRO Congress in Vienna in 1961 the program was broadened to include the full range of forest products research. The initial emphasis was on three fields: (1) wood quality, macro and micro; (2) sawing and machining; and (3) performance of wood in tire [5].

At that time FAO was still concerned with forest products research and it remains active in wood technology today. However, following a joint meeting of Section 41 and the FAO Conference on Wood Technology in Madison, Wisconsin, in 1963, FAO elected to emphasize its primary mission of work with developing countries.[6].

The scope of the section's program broadened further when an all Section 41 meeting in Melbourne, Australia, in 1965 brought together working groups on wood quality, mechanical conversion, performance of wood in fire, wood physics, wood and tree chemistry, wood protection, mechanical properties of wood, and structural utilization of wood and wood products. By this time, the effort was becoming truly international as scientists from 15 countries discussed progress and priorities in forest products research and agreed on approaches and techniques. The name of the section was then appropriately changed to "Forest Products-" [7].

## DIVISION 5

The rapid growth in member organizations and research scope of IUFRO led to a complete restructuring in the 1960s [8]. Out of this came Division 5, Forest Products, with subject groups S5.01. Wood Quality, S5.02 Wood Engineering, S5.03 Wood Protection, and S5.04 Wood Processing. This structure was adopted at a Pre-Congress meeting in Madison and at the XV IUFRO Congress in Gainesville,

Florida, in 1971. Also added then were two project groups, P5.01 Properties and Utilization of Tropical Woods and P5.02 Terminology (Table 1) [9,10,11]. An All Division Meeting in South Africa in 1973 provided an opportunity to smooth out the structure and establish working relationships (Table 2). These were evident in a full array of activities at the XVI IUFRO World Congress in Oslo, Norway in 1976. It is interesting that this early structure of the division had a working party S5.01-07 (Quality of plantation grown wood) that disappeared in the next few years, but is now a topic of great concern. Before the Oslo Congress an incipient working party on pulp and paper was identified in S5.04, but discussion with Scandinavian pulp and paper scientists discouraged its continuation on the grounds that such scientists *were* well represented and integrated by associations already established within the pulp and paper industry. Changes in S5.03 reflect changes in research interests and needs, as well as the active program of the International Research Group on Wood Preservation, with which there was close association and overlapping membership and objectives.

As the Division continued to expand its activity through subsequent congresses in 1981 (Kyoto), 1985 (Ljubljana), with intermediate All-Division 5 Conferences in Oxford (1980) and Madison (1983), two additional project groups were added to provide a focus for research in energy and chemicals from forest biomass (P5.03) and production and utilization of bamboo and related species (P5.04) (Table 3). A new working party in S5.04 signaled the emergence of major research focus on composite products, a field which had been developing for more than 30 years by that time. As we moved into the Ljubljana Congress in 1985 and the Sao Paulo Conference in 1988, new research emphases were indicated by two more project groups on tree ring analysis (P5.05), reflecting new efforts in dendrochronology, and forest products marketing (P5.06), recognizing the emergence of this field as one critical to effective utilization of forest products by bringing together producers and consumer needs (Table 4). Organizing for the Montreal Congress in 1990 and the Nancy Conference in 1992 recognized the field of research in non-wood forest products (P5.07), a very old field, but one in which activity was beginning to attract world wide attention (Table 5). The Congress at Tampere in 1995 saw a

comprehensive review of the division structure that recognized the insignificant differences between subject groups (S-) and project groups (P-) and dropped that designation. The reorganization of division 5 also recognized the role of industrial engineering in wood processing (5.04.13), focused attention on research in nondestructive evaluation of products and materials (5.02-01), provided a central point for the rapidly growing field of composites research (5.05), and drew new attention to bamboo as a building material (5.08.01). All of this built on the basic division framework established in the early days (Table 6). This is the structure of the division around which the Conference in Pullman in 1997 was built and which exists today. As a result of this meeting, a new research group, 5.12, Sustainable Production of Forest Products, was established. This new group was formed as the concept of ecosystem sustainability climbed to the top of the forest management agenda. It also reflects the realization that sustainable forest management practices must be developed to provide for the increasing demand for supplies of fiber and other forest products as we move into the twenty first century.

#### WHERE WE STAND NOW

As we look back on the half-century of forest products research in IUFRO we see several trends that have led us to where we are now and indicate where we might go in the future. The organization is now one of the largest in IUFRO, with eleven subject groups and 24 working parties. This reflects a great breadth and depth of science and technology that we can focus on meeting people's needs for products of the forest *resource*. Broad geographic involvement brings together researchers from all parts of the world. Each researcher is particularly concerned with local problems, but can also bring a unique perspective on both global problems and those that are local in other places. We have an ability to communicate that we could not even dream of a decade ago. However, there is obvious variation in this ability between nations and institutions. There is strong commitment to collaboration and collective action. However, there is wide variation in ability to act on this. A common awareness exists that effective use of forest products is a key to sustainability of the forest resource and to its ability to meet the needs of society. The program of Division 5 has now

broadened to recognize new needs for research on forest products as scientists in various parts of the world have sought a forum for sharing ideas, notes, and accomplishments. The results have been many: (1) new knowledge of wood quality factors, (2) new approaches to the efficient use of wood as an engineering material, (3) effective processing methods to deal with the growing diversity of resources, processing conditions, and product needs, (4) effective, environmentally friendly methods of wood protection, (5) new concepts related to composites of wood and other materials, (6) methods for dealing with the growing trade in tropical woods, (7) more efficient use of wood for energy, (8) better understanding of nonwood products, their resources, and their derivative, (9) improving use of bamboo and rattan, (10) new advances in growth ring analysis, and (11) broader understanding of marketing techniques of effectively match products to consumer needs.

#### FUTURE

We face new challenges as we consider the future of forest products research in IUFRO. No major problems are purely technical and disciplinary - they are social, economic, psychological, and traditional. As we look to the future, we face new social, economic, environmental, and technical needs, with new technology and scientific advances to strengthen the work. An increasingly diverse resource and rapidly growing dependence on plantations leads to new considerations of wood quality and characteristics and factors that influence them. New opportunities for efficient structural use to meet human needs for homes and other buildings call for new creativity in wood engineering. As use conditions and environmental concerns call for approaches to wood protection that are economical, safe, and environmentally acceptable, new approaches to processing are called for by a diverse resource and new needs for resource conservation. Special consideration of resource and social problems of the developing world call for new attention to the use of tropical woods. Composites offer new creative opportunities for use of residues and diverse resources, including plantation timber, to meet human needs effectively, often in combination with other materials. Nonwood products from the same forests as wood products are an increasing element in the socio-economic

structure of regions and communities, along with opportunities to use rattan and bamboos. We are beginning to deal effectively with marketing as the means to see that forest products are appropriately related to the needs of consumers.

As we consider those challenges and the future of forest products research in IUFRO, here are some points we should consider as we plan for what will be reported at the XXII Congress and beyond:

1. Develop depth and disciplinary strength within our groups and working parties, aggressively joining with others in this and other Divisions to focus on solutions to problems.
2. Actively plan and implement joint efforts with specialists from different fields to identify and solve forest-related problems.
3. Develop planning and management techniques that are uniquely adapted to voluntary organizations.
4. Strengthen channels for communication and for transmitting and discussing information.

Spectacular opportunities and challenges lie ahead in terms of the need for wood science and technology to provide a basis for the more effective development and use of forest products. The results of our work must meet increasingly urgent needs as world population draws near six billion people - all dependent in some way on effective use of the forest resource. This becomes more urgent as the resource on which they depend declines in amount and quality. This is our challenge as we look ahead to the real meat of our activity. Not just meetings, but meeting the needs of increasing numbers of people with fewer resources, higher costs, and increasingly urgent consideration of environmental effects, other forest uses, and the social and economic well-being of those people.

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