SOME IMPRESSIONS OF THE THIRD WORLD FORESTRY CONGRESS AND THE TIMBER INDUSTRY OF FINLAND AND SWEDEN

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During the summer of 1949 I was one of the Canadian delegates at the Third World Forestry Congress in Helsinki. This provided the opportunity to visit research institutions and selected timber industries in Finland, Sweden and Norway.

Interest in forest and forest products research in these countries is high and much in common with Canada was noted. However, this somewhat specialized subject would appear to be outside the scope of an article of this nature.

In considering the forest industries of the three countries, there is a great similarity between species cut, manufacturing methods and equipment used. However, at the present time, the output of the sawmills and wood-working plants of Norway is being used internally, mainly for rebuilding the war-devastated areas in Northern Norway. On the other hand, export markets are the main concern of the Finnish and Swedish timber industries. Although many interesting plants were visited in Norway, this description of the timber industry has been confined to Finland and Sweden.

WORLD FORESTRY CONGRESS

The Third World Forestry Congress was held in Helsinki from July 11th to 20th inclusive, with 406 members (together with 129 associate members—mainly wives of members) in attendance. The 29 countries represented included Argentina, Australia, Austria, Belgium, Brazil, Canada, Ceylon, Denmark, United States, Finland, France, India, Indonesia, Israel, Italy, Mexico, Norway, New Zealand, Pakistan, Netherlands, Poland, United Kingdom, Sweden, Switzerland, Czecho-Slovakia, Turkey, U.S.S.R., and occupied areas of Germany and Japan. The complete proceedings of the Congress will be published and given wide distribution. This article, therefore, will only deal with certain highlights of special interest to Canadians.

Prior to the Congress, four-day excursions to selected forests and woodworking industries had been arranged for the delegates. A program had been prepared of visits during the day time, with dinners and other social activities during the evening. Travel was by train and by private bus, and an energetic schedule was strictly followed. An outstanding feature of these excursions and of the Congress was the warmth of the hospitality of the Finnish people. The contacts with the people and with the country and its industries were such as to produce respect and admiration for Finland and its people.

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The Congress was well organized, with extremely efficient administrative and transportation arrangements. After the opening ceremonies, attended by the President and the Prime Minister of Finland, the Congress was divided into Sections to discuss papers on: I. Silvics and Silviculture, II. Forest Surveys, III. Forest Economics, IV. Forest Utilization, and V. Forest Industries. The Congress concluded with plenary sessions at which the resolutions proposed by the various Sections were considered.

In reviewing changes that had occurred in the thirteen years that had elapsed since the previous World Forestry Congress it was felt that one of the most striking is the recognition of the principle that the management and conservation of forests and the manufacture and distribution of forest products must be regarded as an inseparable whole. It is the primary task of the forester to grow and produce both the amounts and the kinds of forest products needed by industry and other consumers compatible with the protective role of forests and the conservation of land productivity. At the same time it is the responsibility of technical research and industrial development to provide suitable outlets for all products of the forest crop and to adjust conversion methods and uses to the limitations and requirements of sound silviculture.

In the discussion on forest genetics and seed production it is probable that the future will see the establishment of seed orchards to provide tree seed for planting. However, it was recommended that wherever practicable, and pending the establishment of such seed orchards, the seed harvest should be derived only from recognized elite stands or trees. The recommendations regarding aerial forest surveys included one that all institutions for higher forestry education should (where practicable) offer courses in photogrammetry for their students.

Emphasis was given to the opportunities which a forest inventory offers to assess the kinds and quantities of silvicultural work which may be needed to improve the productivity of the different forest stands. In this connection some discussion arose as to whether future silvicultural treatments should aim at production of trees of high quality or at production of maximum volume of wood. It was informally agreed that "quality" was not the correct word to be used in a discussion conducted in world-wide terms, but that the forests of each country should be managed so as to secure maximum utility under the conditions actually existing in that country.

In discussing forest workers and technicians it was agreed that continuous production was essential for the stability and security of these workers, and that vocational training was indispensable to insure the maximum of productivity. In this connection it was recommended that a permanent sub-committee under F.O.A. composed of experts from various countries should be established for the purpose of co-ordinating time studies in forest work and other methods of study related to the use of various types of tools and mechanical harvesting devices in forest operations throughout the world.

The need for continued scientific technical and economic research on wood, with close co-ordination with forest production and wood-using industries was stressed. It was recognized that the problem of the utilization of wood waste remains one of the main pre-occupations of forest economy. In this connection, the coordination or integration of wood-using industries is important as a means of reducing wood waste and of insuring that the various wood-using industries utilize forest resources to the best advantage. The need was stressed for increasing scientific research on the utilization of wood waste and for expanding and creating new outlets for such waste. The importance of wood chemical industries in regard to the rational utilization of forest resources was recognized. In the pulp and paper field it was considered that there was a need for developing techniques for producing dissolving pulps of uniform quality and of devoting more attention to woods of broad-leaved species, including tropical woods, for the manufacture of pulp and paper. It was further considered that semi-chemical pulping processes offered an opportunity for overall conservation of pulpwood resources because of the greater yields obtained and of the reduced wastage of wood constituents. The importance of structural design and of the fire-proofing of timber as a means of reducing the risks of fire were stressed.

The Congress provided opportunity for foresters, industrialists and technicians from all parts of the world to meet and exchange views and experiences and to establish personal relations which will stimulate and facilitate future work. An important, interesting and strenuous feature of the Congress were the activities held outside of the regular sessions. These varied from social gatherings in which all members participated, to get-togethers of small groups having common interests. It was especially easy to find points of mutual interest with the various Finnish and Scandinavian lumbermen and research workers attending, and there were numerous small gatherings at which there was a mutual exchange of information regarding conditions in Canada and Scandinavia.

FOREST INDUSTRIES OF FINLAND AND SWEDEN

The outstanding commercial species of Finland and Sweden are the Scots pine (*Pinus silvestris*), spruce (*Picea excelsa*), and birch (*Betula odorata* and *B. verrucosa*). In addition, there are small stands of oak, ash, maple, aspen and alder in the southern portion. In general, however, the timber industry is based on the three main species which thrive well, with trees of excellent quality, form and height.

In both countries the importance of the forests and wood-using industries is fully realized. Great attention is, therefore, paid to insuring that the forest and forest industries are on a continuing basis. In Sweden it has been necessary to actually dismantle sawmills and pulpmills in order to insure that the cut does not exceed the forest growth.

Both countries are characterized by an elaborate system of rivers and lakes which have been extensively developed for the efficient movement of wood to the sawmills. Large industries have developed on the sea-coast on harbours close to the mouths of these rivers. While the supply of wood

in these areas is augmented by the use of railroads and, to a limited extent, by motor-trucks, these highly developed waterways remain the main source for the movement of sawlogs and pulpwood. These waterway systems are well developed with floating associations organized by law for each floatway (interconnected lakes and streams). These companies are responsible for the movement of logs in all shared floatways and for the operation of sorting works at destination.

In Southern Finland only a limited (less than 10 per cent) amount of the forest area is owned by industrial companies with over half of the forest areas being formed of private estates and farm woodlots. This means that it is necessary for the sawmill and pulp companies to purchase most of their wood from private sources. The forest owners are well organized, both in co-operative organizations and also through a Central Forest Association. They are reputed to have a good appreciation of the value of their wood and, as a result, they demand a high stumpage price.

In statistics for the forest industries of Finland distinction is made between (a) the mechanical industries such as sawmills, planer mills, plywood factories, joineries, etc., and (b) the pulp and paper industry. In 1946 the mechanical forest industries in Finland employed over 40,000 workers consuming about six and one half million cubic meters¹ of wood while the pulp and paper industries employed over 14,000 workers and produced about two million metric tons. Certain large firms which include a wide range of forest industries dominate the export trade. These organizations were originally started by operating sawmills only. The trend now, however, is to obtain more complete utilization, not only by operating pulp mills in conjunction with the sawmill, but also by installing joinery and smaller woodworking factories for the production of doors, sash, built-in furniture, prefabricated housing, etc. A considerable portion of the prefabricated houses have been used for reparation shipments to U.S.S.R.

In Sweden the trend in the forest industry is similar to that in Finland. From the early 1900's the value of the sawn lumber decreased while the importance of the pulp industry increased. Lately, however, the sawmill industry of Sweden has increased the value of its products by the development of its joinery factories producing standardized doors and windows, prefabricated housing units, and plywood.

The general trend in the forest industries of Finland and Sweden is definitely towards integration. This is especially noticeable in the groups of plants which were visited around the harbours of Kotka in Finland and Sundsvall in Sweden. In both these areas the plants visited are actually groups of plants (sawmill, pulp or wallboard mill, joinery factory and chemical by-products plant). The plants in each of these areas are under the same management and are located adjacent to water systems providing cheap transport of wood to the mills, good sorting facilities and water on which to move and interchange the wood and by-products between the plants. This factor of accessibility to navigable water plays an important

¹ 1 cubic meter equals 35.3 cubic feet.

part in two of the main determining factors of integration, viz., transportation and handling costs.

The equipment and methods used in the sawmills visited are almost identical with the exception that in Finland a considerable percentage of the sawmill crew are women while women are not used in Sweden.

The pulp mills visited were units of large corporations and were, therefore, being operated as part of an integrated operation using as much sawmill waste as possible (up to 60 per cent). Pulpwood is brought to the mills and stocked in the yard in lengths up to 22 feet. At one mill the material was being fed to the chippers in these long lengths. Utilization of mill waste for pulpwood and handling of the wood at the pulp-mills are greatly facilitated by the regulation that all softwood must be barked in the woods. The material being processed at the pulp mills was free of bark and was run through drum barkers to remove any discolouration that may have resulted during the floating of the material.

LUMBER MANUFACTURE

In the Scandinavian countries (including Finland) the standard of lumber manufacture is high. The waste percentage is low, the lumber is so accurately sawn that it can be used for building purposes without subsequent planing and the appearance of the export lumber is attractive. The present system of manufacture is the result of many years' experience and is well suited to the type and size of logs being cut.

The manufacturing system is built around the use of the frame gang-saw, operated in pairs, for the breakdown of the log instead of the circular or band headrig used in North America. The following are points of interest noted:—

- (a) Sorting of the logs into $\frac{1}{2}$ -inch diameter classes prior to sawing is an essential step. Every log is calipered and marked by men standing in fixed barrels at the entrance to the sorting pockets.
- (b) High yield of lumber results from the use of comparatively thin saws in the gang-saws and from cutting the centre portion of the log into $2\frac{1}{2}$ " boards which are sent to the planing mill for remanufacture on the thinner-saws of the resaws there.
- (c) In modern gang mills, having the sawyer seated on the log carriage and with the fast stroke that can be used with the lighter sash resulting from improved light-weight alloys, the production is good. In mills using a production bonus system as is in effect in Finland and Sweden, the speed at which the carriage is loaded and the log entered into the saw-frame is remarkable, producing an almost continuous flow of lumber with practically no lost time. One tandem gang-mill will produce from 36 to 40M ft. b.m. per 8-hour shift using six men up to and including the edging process.
- (d) The Scandinavian edger is an accurate and fast machine. As comparatively narrow boards are the only material handled by the edger, two saws only are required, one fixed and the other movable. This latter saw is moved by an hydraulic device which insures accurate settings. Each saw runs in a narrow groove in a steel table, with the

table containing the adjustable saw moving with the saw. The resultant product is clean-cut and true to size.

- (e) Accuracy of manufacture is an essential quality of the sawn lumber. Allowance for shrinkage is carefully calculated and compensated for in the setting of the saws. As a result, the finished product has been accurately cut to a full nominal size.
- (f) The sorting on the green chain is very diversified. For example, at one mill visited there were 96 bins in use to handle the range of thicknesses, widths and grades. The width increased by multiples of $\frac{1}{2}$ ".
- (g) The three main grades are Unsorted, No. 5 and No. 6. The Unsorted, which includes the best material cut up to and including No. 4 grade, is of attractive appearance.
- (h) The care taken in handling the dry lumber from mill to the ship is an important factor in insuring that the product arrives at its destination attractive in appearance. Final trimming of the lumber to length is done by fine-tooth saws on the dock as the seasoned lumber is en route to covered barges. As the lumber is piled into the barges, the mill and grade marks are stencilled on to the freshly cut ends. The lumber is under cover on these barges until it is hoisted on board the steamer.
- (i) Where the sawmill is part of an integrated utilization, the wood (which is bark-free) is considered to be of equal value. As a result, in such sawmills the trimming and ripping to remove defects and wane appear heavy—producing high quality lumber, with the material trimmed or ripped being sent to the integrated pulp-mill. Such material is not regarded as "sawmill waste".

The Scandinavian method of manufacture is best suited for logs of comparatively small size and uniform quality. It is not applicable to logs such as white pine, Douglas fir and western hemlock, where it is necessary to turn the log in order to obtain high-grade lumber. However, it is considered that there are many types of operations in Eastern Canada where the size and quality of the logs are similar to those used in Scandinavia and where the frame gang-saws operated in tandem might be profitably used for the manufacture of logs into lumber.

PLYWOOD AND JOINERY

In the plywood industry birch is the species used. Special attention is being paid in the forest to the growing of birch for the plywood industry. This is done by selecting birch species, by looking after young birch forests, and by favouring birch in mixed stands on good forest soil. In Finland the birch logs for the plywood mills are cut during the summer months—left for about two months unlimbed to expedite seasoning, then limbed, cut to length, end coated and decked ready for floating in the spring. Occasionally the logs are rail hauled distances up to 150 miles where a suitable water route is not available. At the mill the logs are generally stored under water. The logs used at the plywood mills are small (even by Eastern Canadian standards) with diameters as low as 7 inches. However, they appear to contain fewer large knots than birch

of similar size in Canada.

At a typical plant visited in Finland there were eight veneer lathes. Six of these lathes were peeling logs up to 48" in length while the other two lathes were peeling the cores after they had been cross-cut to 23" in length so they could be peeled to a smaller diameter than was possible on the 48" lathes. Behind each there was a hand-operated clipper worked by two women. These women were very skilful in trimming the veneer so as to reduce waste to a minimum and get the utmost out of the log. The subsequent steps of converting the veneer into plywood were very similar to those in the Canadian plant with the exception that there was more manual handling. Most of the employees were women, on piece work, and working at a fast tempo. Very extensive knot removal and patching of small pieces—by hand and by machine—was practised and a wide range of sizes and grades was produced. Pine plywood was manufactured for use in covering the hollow-core flush type doors which were a feature of the door factories visited.

The outstanding feature of the joinery factories is the extent to which low-grade lumber and small sizes of wood are utilized, after careful sorting, by such means as using the high-grade material for facing only on built-up material, and by designing their flush doors and similar products to utilize small pieces. In this connection a typical door consists of, (1) edge strip of knot-free pine—width according to the thickness of the door, (2) rails, stiles, and lock blocks of $2\frac{1}{2}$ " selected pine, (3) core made up in the form of a grid and comprising either small pieces of wood glued together or strips of wallboard, and (4) face consisting either of birch or pine plywood or $1/8$ " or $3/16$ " hardboard covered with a face veneering of 1.5 mm. birch or pine veneer. In most cases the door is so designed as to permit ventilation to the interior so that the exterior and interior of the door are exposed to the same atmospheric conditions. Sash is usually constructed in units comprising frame, window and storm window. The units seen were of good design, operated easily and were well constructed.

CONCLUSION

Noticeable features of the Finnish and Scandinavian industries are—(a) the general appreciation of the importance of the forests and of the necessity of maintaining them on a permanent yield basis, with the industries adapting their cut and manufacturing practices to conform with the forestry policy, and (b) the high quality of the lumber products, especially those manufactured for export. The practice in these countries is to obtain as complete utilization as possible by "integrated utilization", which includes operating pulp and wallboard mills in conjunction with the saw-mills and by installing woodworking factories for the production of doors, sash, built-in furniture, and prefabricated housing. The areas visited are particularly well suited for integration as the industries are grouped adjacent to water suitable for the floating of logs and for the water movement of waste and other by-products. This accessibility to navigable water plays an important part in the very complete utilization at the plants visited as it helps solve the two important problems of integrated utilization, viz., transportation and handling costs.