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*Legislative Commission on Minnesota Resources*

***Forestry in Minnesota***

**A PRELIMINARY APPRAISAL**

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## FORESTRY IN MINNESOTA - A PRELIMINARY APPRAISAL

## Preface

The Legislative Commission on Minnesota Resources contracted Jaakko Pöyry Consulting Oy in the fall 1977 to carry out an appraisal mission on forestry and forest industry problems in the state with the aim of:

- identifying and evaluating major problem areas
- assessing the availability of basic information for legislative and planning purposes
- formulating a proposal on subjects and problem areas to be investigated in the Broad-based Study planned by the Commission

A team of five specialists paid a two-week visit to the state on January 16 to 27, 1978. They contacted a large number of representatives from various Federal, State and private bodies and organizations. A series of unstructured interviews was held and a wealth of background information collected.

This concise report summarizes the main findings of the appraisal mission. Emphasis has been given to the most important problem areas. Because of the nature of the task and the limited time available many of the findings are preliminary and subject to further investigation. At this stage, value judgements and opinions have been avoided, but in some cases, where supporting facts are lacking, this has not been possible.

As agreed, a separate proposal for the terms of reference for the Broad-based Study will be prepared by the Consultant.



Risto Eklund



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INTRODUCTION

Crop and range land, mineral deposits and forests are the principal natural resources providing a living for the people of Minnesota. In 1970 forest land covered 19.0 mill. acres or 37 percent of the total land area of the state.

In general terms, a forest resource is used for the following purposes:

- Conservation of a unique ecosystem with various highly beneficial effects
- Timber production
- Wildlife management
- Recreation
- Pasturing

Timber production and processing usually give the most important and tangible contribution to the material welfare of a community. In Minnesota, forest industries are one of the biggest sectors of manufacturing industry. Total employment in forestry and wood-based industries is around 56 000 of which 10 000 are in logging. The value of forest products (including remanufacturing in the state) was estimated at \$ 1.3 billion in 1974 and \$ 1.1 billion in 1975<sup>1)</sup>.

The general conditions for forestry and forest industries are favorable in Minnesota. The climate and soil are good for tree growing, the terrain is easy, the winter is helpful for logging, great consumption centers and regions with little own forests are not far away, and recruitment of a capable work force for forestry has been no problem.

The annual harvest of timber could be considerably increased and the forest industries could be correspondingly expanded. The direct and indirect benefits of such a development would be obvious. At present, Minnesota is a net importer of wood-based products some of which could be manufactured within the state.

The timber economy of Minnesota is dominated by an increasing supply of lower value hardwood. This trend is likely to continue because changes in the wood-growing apparatus are time-consuming in the conditions of Minnesota. Therefore, the industry has to adapt itself to the raw material base. This may involve adjustments in the product mix and plants may even have to be closed down.

1) Minnesota Statistical Profile 1976

On the other hand, there is scope for a large expansion of wood-based industries provided that the industry will be able to process the particular kind of raw material which is abundantly available. From the viewpoint of forest management, there is a pressing need to remove this excess wood.

Against this background major adjustments and changes will be necessary and to this end large investments in forests, industrial plants and various associated fields will be needed. Intensive research and thorough planning are needed to guide the future development.

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## THE NEED FOR SPECIFIED GOALS AND OBJECTIVES IN FORESTRY

In land use planning, the importance of forestry has often been underestimated. Forests have been considered a general reserve from which land has been transferred into more important or higher return uses, such as agriculture, pasture, real estate, communications, etc. Many other uses have also been given precedence over forestry. Constantly changing demands on land are not in line with the long life span of trees and the need for long-term planning of forestry.

In Minnesota and in the United States in general the multiple-use concept has been a dominating theme in the forestry sector. But contrary to this, there has been a continuing and apparently increasing tendency to set aside forest land for special purposes involving only one particular aspect, such as wilderness preservation, wildlife management, recreation, water, etc., but excluding commercial timber production.

Legislation has been slow to decide on priorities between alternative uses of forest land. There is in fact a general lack of specified objectives within the whole forestry sector. This is perhaps typical of a society with abundant and diversified natural resources. The need for explicit goals and priorities tends to arise only when shortages are anticipated or have occurred. At present there even seems to be competition between civic groups interested in some specific non-timber use.

The multiple-use approach is still a commonly accepted basis to achieve a balance between the various uses of forest lands. Such a conclusion has been reached in a number of industrialized countries long before the multiple-use concept was even invented. Yet, it is apparent that certain areas are to be reserved for single purposes. But this should not take place unless the specific goals can be reached through the multiple-use approach, which does not exclude the production of timber.

In government spending in Minnesota, the timber economy has been given roughly the same emphasis as e.g. parks, game and fish, and recreation in general. The fact that the volume of timber produced is only a fraction of what it could be is not commonly recognized.

The problem of defining the goals and objectives for the timber economy and especially the task of approaching the targets to be set is getting more difficult because of the diversified forest ownership structure in Minnesota.



Federal, State and County forests, which all are under separate management, account for 52 % of the total commercial forest area. About 500 000 acres are under the management of the Bureau of Indian Affairs, 800 000 acres belong to forest industries and 6 470 000 acres or 40 % is owned by farmers and other private persons.

Each of these owner groups has its own management objectives. Especially many of the absentee forest owners, whose numbers and shares are steadily increasing, seem to have other management goals than timber growing. In the long run this may mean a substantial transfer of forest land away from commercial timber production.

The lack of goals and priorities is one of the reasons why guidelines for investments in forestry are insufficient. This may lead to incorrect allocation of the limited funds available.

The role of Minnesota's forests as a source of timber and the role of its industry as a producer of wood-based commodities must be clearly defined. This should be done within the framework of the national development foreseen in the United States. In accordance with the National Resources Planning Act of 1974, these problems are under intensive study on federal and state level, and valuable conclusions are already at hand. Several states have introduced or are preparing forest practices and planning acts to enhance and control the development of forestry.

## 3

## THE FOREST RESOURCE

## 3.1

## General Background

The present state of silviculture in Minnesota is to a great extent a result of the timber history. The virgin forests of this region were heavily exploited during a period of 30...50 years prior to the first world war.

After this period, little or no care was taken of the cutover areas which nearly always were burnt, often repeatedly. However, in most of the areas natural regeneration was rapid and soon new forests were coming up. These consisted mainly of so-called pioneer hardwood species, and were not comparable in volume or quality to the virgin stands. As a result of the relatively short exploitation and regeneration period, present hardwood forests are commonly dominated by about one age-class which by now is nearing maturity.

During the first exploitation, there were large commercial sawmills which in due time disappeared. A great number of local sawmills remained and they used the remnants of the virgin forests and, step by step, logs from the new forests when they became available. Thus, logging was concentrated on sawlog quality and size, and there was little or no demand for small-size or low-quality wood. Consequently, commercial thinnings have rarely been possible. This dilemma has only partly been alleviated through the more recent progress of pulp and panel industries.

## 3.2

## Present Situation

There are now huge quantities of small and low-quality wood and an alarming rate of mortality. Unless the removal of this wood can be greatly stepped up, the forests will deteriorate further. In addition to industrial processing, the possibilities of using this excess wood as fuel should be studied carefully, Minnesota being almost entirely dependent on outside energy supplies.

Minnesota's forest resources are now far from fully utilized. The net growth of timber per annum is 27 cu ft per acre which is approximately 50 percent of the potential yield. The average annual removal is about 9 cu ft per acre, which is 33 percent of the current net growth and 17 percent of the potential yield.

It is estimated that the people of Minnesota consume, in round-wood equivalents, about 50 percent more wood and wood-based products than are now produced in the state. This means that in spite of the underutilized forests, Minnesota is a net importer of processed wood-based products. On the other hand, it is a net exporter to neighboring states of unprocessed wood raw material.

The bulk of Minnesota's forest resources are in areas which suffer from structural and seasonal unemployment.

During the last few decades, the growing stock of the Minnesotan forests has been increasing. At the same time, the share of softwoods and trees of sawlog size has decreased. This is explained by:

- the small removals in proportion to the net growth
- the increasing share of mature stands caused by the distorted age structure
- the heavy harvesting of the most valuable timber crop
- the limited timber stand improvements and insufficient commercial thinnings
- the domination of hardwood species in natural regeneration and the limited planting of softwoods
- the allocation of some softwood-dominated areas for wilderness or other single-use purposes

Based on the preliminary inventory results of 1977, it seems reasonable to conclude that the quality of the growing stock has declined more than generally expected. In five Arrowhead counties<sup>1)</sup> the commercial forest area has decreased by 17 percent from 1960 to 1977. The volume change has been as follows:

<u>Species</u>	<u>1960</u>	<u>1977</u>	<u>Change, %</u>
	- mill. cu ft -		
Pines	7.34	4.84	-34
Spruces	7.34	5.62	-23
Balsam fir, tamarack, cedar	7.92	9.19	+16
Paper birch	4.39	6.27	+43
Quaking aspen	13.74	13.00	- 5
Other hardwood species	<u>4.76</u>	<u>8.03</u>	<u>+69</u>
TOTAL	45.49	46.95	+ 3

1) Carlton, Cook, Koochicing, Lake, St. Louis counties.

3.3  
Losses Caused by Mortality

The present high rate of mortality represents an extensive loss of wood production. The following are approximate figures for Minnesota in 1970<sup>1)</sup>:

	<u>Mill. cu ft/year</u>	<u>Percent</u>
Gross growth	593	100
Mortality	<u>-137</u>	<u>-23</u>
Net growth	456	77
 Removals	 155	 26

Thus, a volume which is nearly equal to the present level of removals is being lost through mortality. Apart from natural reasons (insects, fungi, wind, etc.) the loss of growing stock is caused by excessive stand density. The lack of thinnings, the too high proportion of mature stands, and inadequate cutting of the harvestable timber crop in general, are the reasons for this adverse trend.

3.4  
Underutilization

Only half of the production potential of the Minnesotan forests is being realized as net growth and only a fraction is being utilized. The following are the key figures:

	<u>cu ft/acre/year</u>
Productive potential	53
Current net growth	27
Removals (1975 level)	9

In a regional comparison of forest utilization Minnesota ranks lowest compared with other Lake States or the US average (see Appendix).

The underutilization primarily concerns hardwoods, while the softwood resources to a large extent are fully utilized, and quality timber is even overutilized. Removals amounting to the net growth level would increase the annual wood supply by about 190 mill. cu ft, corresponding to about 2 million cords. In estimating the value of the forestry produce in the state<sup>2)</sup>, \$ 310 has been used as the total sales value generated by one cord of pulpwood. Based on this estimate, the potential timber harvest in question would have a value of \$ 620 million per year. This indicates the order of magnitude of the potential contribution to the economy now left unutilized in the forests of Minnesota.

1) The Outlook for Timber in the United States, FFR -20  
2) Statistical Profile of Minnesota 1976

### 3.5 Planting and Nurseries

Statistics show that planting - afforestation and reforestation - which is of urgent priority in Minnesota, has decreased during the last few years. This is also reflected in the nurseries. Of three sizeable state nurseries one is closed for the time being, and two operate at reduced capacity. This is a pity since the nurseries are efficiently organized and ready to serve much larger planting programs.

This is mainly due to the financial and profitability constraints in forestry.

### 3.6 Need for Site and Stand Classification

An economically sound program to intensify and increase timber growth requires the development of a particular site and stand classification system which would ensure that the limited funds available are used in the right order of economic priority.

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## LOW PROFITABILITY OF TIMBER GROWING

In the State forests, the annual timber growing costs, as rough averages, are about \$ 0.20/acre and stumpage revenues about \$ 0.60/acre. The continuing deterioration of the forest in Minnesota has to be seen against these extremely low figures.

Building the growing stock so that it will correspond in volume and quality to the productive potential, would require about ten times higher silvicultural inputs than at present, mainly for reforestation and precommercial thinning. The total inputs for all commercial forests in Minnesota would then be about \$ 34 million per year.

The comparison of current and desired costs reveals that the current stumpage income of a timber grower is a fraction only of the minimum needed for proper forest management and silviculture. There is now little or no economic incentive for woodland owners, in particular the private ones, to improve or increase timber production.

The problem is a vicious circle which has to be broken from outside, e.g. by increased public participation in financing.

The profitability of timber growing could be improved by the following means:

- by increasing the volume harvested per acre
- by improving the quality and unit value of the timber crop by increasing the proportion of valuable species and saw timber
- by increasing and diversifying the demand for timber
- by reducing unit logging costs

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## COUNTY FORESTS

About 3.3 million acres of commercial forests are on tax forfeited lands now administrated by the counties. The annual gross revenues received from these lands are about \$ 4 million of which only 35...50 % is from the sale of timber, hunting and recreational leases, and similar.

Most of the counties, which have significant areas of tax forfeited lands, have organized special departments to manage these lands while in some cases the management is given to the county auditor's office. Only a few foresters are assigned to the management of these forests, however. The intensity of management and such silvicultural inputs as reforestation and timber stand improvement varies much from county to county, but it is generally low.

Some important community functions already benefit from the income generated by the forests on tax forfeited lands. As a whole, these forests represent a much higher potential for production and income than now received. The areas to be used for commercial forestry should be selected as soon as possible and long-term plans should be prepared. The multiple-use concept should be particularly well suited for these forests. The main problems in the management would seem to be:

- to establish a clear legal status for these lands
- to find the best organizational way for proper management of the county forests
- to get sufficient funds for improved silviculture

## 6 PRIVATE FORESTS

### 6.1 Organizational Responsibility

In Minnesota private forest owners, excluding the industry, own and manage almost 40 % of the commercial forests. The farmers own 3.2 million acres and miscellaneous private owners 3.4 million acres. On average, these forests are favorably located on good-quality land.

Despite the importance of private forestry there is no central organization responsible for promoting this sector. The county agents advise and help the forest owners, but most often their time is used for a number of other services. By statute DNR shall also assist private forestry, but no one within this body is solely responsible for this. Only in exceptional cases there seem to have been attempts to organize full-time professional support to private forestry.

The poor success of the federal forest improvement program in Minnesota indicates that the approach is inadequate. It is difficult to make the forest owners interested in the available programs. Sometimes they are not even aware that such programs exist. These problems are becoming even more difficult when the number of absentee owners increases. Further problems are the lack of know-how and management skills, and the limited supply of suitable technical equipment and contractors for carrying out the day-to-day work.

The basic constraint for private forestry in Minnesota is its low profitability which, of course, affects the business of other owners, too.

### 6.2 Public Financing

Federal support is at present available for timber growing in the form of financial contributions over the Forestry Incentive Program. The State is contributing professional aid. However, even the limited funds and means that have been available have not been fully used. Possible reasons for this may be that:

- the support is not sufficient to make timber growing an attractive proposition for a forest owner who has alternative investment opportunities
- forest owners are not sufficiently aware of the availability of support and/or lacking interest to fulfill the formal requirements of application
- sufficient professional assistance is not easily available



### 6.3 Cooperation

In various parts of the United States several attempts have been made to arrange cooperation between private forest owners as a means of promoting forest management and improving profitability. The aim has been, on a joint basis, to hire professional aid, to procure equipment and skilled labor, to arrange sales of timber, to run some forest industry, etc. For various reasons these attempts have rarely produced any great results. Nor has this type of cooperation developed much in Minnesota.

In other parts of the world an advanced cooperation has been highly successful in assisting private forest owners towards better management and higher returns. The possibilities of using this approach in Minnesota would seem to be worth studying.

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## NON-TIMBER USES OF FORESTS

## 7.1

## Relationship Between Recreation and Wood Production

In Minnesota, much attention is given to forests as a source of recreation, which is typical of industrialized societies with high standards of living. This is revealed in the budget of the Department of Natural Resources, in which annual expenditures for Park and Recreation Management roughly equal those for Forest Management.

It is often felt that these two uses of forests are conflicting. The main reasons for this are the impact of logging and afforestation on the environment. For historical reasons, the supporters of increased timber production have much been on the defensive.

The problem is basically a matter of value judgement. Three important aspects should be emphasized in this context:

- Genuine multiple-use forestry should allow recreation and wood production side by side with a minimum of constraint. Decisions should be based on an analysis and full understanding of the interactions between the two uses.
- The effective and sufficient production of commodities based on wood, as a part of a high standard of living, is one of the prerequisites for creating leisure time and possibilities for recreation.
- Forests are one of the few renewable resources. It is hardly wise to set large areas aside for such single-purpose uses that exclude this basic quality.

## 7.2

## Wildlife Management

In the early days of America's colonization hunting and trapping were important means of earning a living. But now these activities are mostly recreation, and wildlife management has become a major public issue in which large civic groups are actively interested and manifold commercial interests involved. In the Minnesota State administration the turnover of hunting and fishing well exceeds the turnover of forestry.

It is sometimes claimed that there would be a conflict between wildlife and forest management. It is true that game animals sometimes damage trees but generally speaking coexistence is well possible without causing serious problems. Regularly managed forests with varying age classes and species are usually favorable game habitats. Proof of this can be seen

in a number of countries with highly productive and well managed multi-purpose forests. In Sweden for example, on an area about twice the size of Minnesota, 60...70 000 moose and 80...90 000 roe deer are brought down each year, not to speak of other game.

In Minnesóta, it should not be too difficult to reach an understanding so that the groups interested in and responsible for forest management and wildlife would fully cooperate for the common good.

## 8

## EDUCATION AND RESEARCH

## 8.1

## Education and Training

The College of Forestry at the University of Minnesota provides high level university education in forestry. The Forestry School in Grand Rapids graduates forest technicians. There is a school in Duluth, which trains forest workers. These are the educational institutions for forestry in Minnesota.

The number of students enrolled in the technician courses and those trained in logging and other forest work have so far been small compared with the enrollment in the College of Forestry. It appears that the number is particularly small compared with the requirements in this field.

At present there are no regular schools or courses that would give particular education and training to private forest owners in silviculture and other forest work. In some countries this type of instruction has been the key to successful management of private forests. It would certainly be worthwhile to explore the ways and means of starting such a program in Minnesota.

## 8.2

## Research

There are several research institutions in the forestry sector in Minnesota. In the federal system, the headquarters of the North Central Forest Experiment Station are located in St. Paul with other research units in Grand Rapids, Duluth and St. Paul, and several in neighboring states. Among the broad range of research subjects the national forest inventories are worth noting in particular.

The College of Forestry is well equipped for research, including wood technology. The industries carry out much research in their own laboratories.

Research programs within the research institutions should be regularly reviewed against the changing requirements of forestry and forest industries. In this report several themes are mentioned in which there would be scope for intensified research.

## ORGANIZATIONS IN FORESTRY

There is a considerable number of federal, state, county and private bodies and organizations in the field of forestry and timber economy. This shows that a broad range of interests and dynamic forces are in action in this sector. It is not possible to enter into a detailed discussion on how effectively the organizations in this versatile field work.

In the previous chapters, however, reference has been made to several organizational aspects and certain ideas have been singled out. The following points would seem to warrant particular study:

- The possibilities of improved coordination, possibly under the leadership of one body, to support private forestry.
- The possibilities of dividing the workload between university-educated and other professional staff.
- The status of the tax forfeited lands and the management of their forests.

In addition to the mosaic of private ownership, federal, state and county forests are intermixed and managed by three parallel organizations. It appears that

- an intensified land exchange program could facilitate more effective forest management
- attention should be paid to the coordination of the three bodies involved

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TAXATION

For the purpose of property taxation the value of the land used permanently for timber growing is set at 20 % of the assessed market value. However, the criterion "exclusively used for growing timber" is not well defined and therefore the application of this 20 % rule is limited. Instead a general 43 % rule is often, in some counties exclusively, applied to the forest lands.

For the purpose of property taxation the value of the land classified as seasonal recreation land is 33 1/3 % of the assessed market value. Furthermore a reduced mill rate is applied. There is no limit on the land area classified as seasonal recreation land. The difference in the tax value assessment gives the forest owner an incentive to withdraw his land from timber growing and to use it exclusively as recreational land.

Forest owners can also request their commercial forest to be taxed under the tree growth law, which is supposed to support intensive forest management. Whether or not a certain land area qualifies under this law, is decided by the county board. Because the tax revenues from any given area are likely to decrease, at least in the short run, if the tree growth law is applied, some county boards have been reluctant to accept forest land to be taxed under this law.

It is apparent that with the increasing land prices property taxation is going to affect the decisions of the forest owners in a direction unfavorable from the viewpoint of better forest management. Therefore the system of taxation should be reviewed comprehensively to eliminate any inequalities between the various land uses, to balance the forest taxation between the various counties and to secure that the principles of taxation intended as incentives for better forest management are not lost.

## 11 LOGGING AND LABOR

### 11.1 Logging

In Minnesota, roundwood sales are nearly always carried out on stump which means that the buyer has to take care of logging. Instead of employing their own organizations for this purpose, buyers commonly use the services of independent contractors.

In this region logging does not require the specialized heavy equipment which is necessary for example in the Pacific, because trees are of modest size and the terrain is easy. At an early stage of mechanization, logging was commonly done with fairly simple equipment with an agricultural tractor as the basic machine. The logging implements were often made locally. This type of logging outfit is still to be seen in many places, in particular in the case of part-time contractors.

At present the trend is towards more sophisticated and heavy equipment. Specially constructed, factory-made skidders, forwarders, feller bunchers, debarkers, chippers, etc. tend to replace the local makes.

Many of these machines are expensive, and a contractor can hardly venture on this type of investment unless he has secured a sufficient volume to provide for amortization. The mosaic of small forest ownerships typical for Minnesota obviously does not promote this development.

There has been competition between the numerous logging contractors and fairly well established market rates for different types of work have emerged. Many observers seem to think that productivity in logging is high and that the costs are reasonable. But there are indications of certain problems. One is the extremely high premium paid in accordance to the workmen's compensation law, in logging no less than 32 %. The most serious problem is probably how the contractor should finance his activities, the purchase of equipment, etc.

### 11.2 Labor

An important problem is the labor supply in forestry. So far this has hardly created any major problems in Minnesota where, particularly in the northern part, seasonal and structural unemployment has occurred.

Up to now logging has been the main type of work in the forests. In the future other activities under the headings of silviculture, conservation, fire and pest control, etc. are likely to increase, although - it is true - this sector so far has not offered very many jobs.

Intensive forest management will best be served through a permanently employed skilled work force which, depending on the season, carries out the different phases of forest operations. This will give the workers a steady income around the year. During certain seasons some additional labor may be needed on part-time basis, for example for planting or in nurseries. This is how things have developed in many regions with intensive forest management.

This is also the best way of securing a continuous supply of labor in forestry in the future. If other industries offer better and more stable incomes, forestry with all the hardships of the work, is bound to lose its manpower. This problem is already felt in some parts of Minnesota. Despite unemployment, there is reluctance to take jobs in forestry.

The high rate of workmen's compensation is likely to be a consequence of the large portion of unskilled loggers often working on a part-time basis. These loggers may avoid paying the high premiums altogether which causes problems later. This also irritates the fulltime loggers who consider the part-timers disloyal competitors.

### 11.3 Training

Vocational training must be an integrated part of a new approach to the labor problem in forestry. There has been favorable experience of courses given in the Duluth school. A well organized education and training program in logging techniques, machine operation and maintenance, silvicultural jobs, and associated subjects has proved to be a good way of attracting young people to jobs in the forests. Good vocational skills guarantee a fair income without excessive physical strain or health risks. Obviously there is scope for a considerable expansion of this type of education and training in Minnesota.



## 12 FOREST INDUSTRIES

### 12.1 The Structure of Forest Industries

One of the main problems of forestry in Minnesota is the discrepancy between roundwood supply and industrial use, as discussed in previous chapters. Hardwoods are not used enough and economic benefits are lost when sawlog timber is used for pulping.

One reason for this is the lack of integration between sawmills and pulp (or panel) mills. As a rule, an integrated mill that can make good use both of sawlogs and pulpwood (be it round pulpwood or chips) can pay a higher price for its raw material than an unintegrated mill. An integrated mill can also utilize the trees more thoroughly. The lack of integration is probably one of the reasons why industry in Minnesota has not been able to maximize the value of its wood intake.

The industry has made major efforts to adapt itself to the changing wood supply. In particular, aspen pulpwood has penetrated into the traditional uses of softwoods. Even so, the industry is still highly dependent on a continuous supply of softwood for pulping. It would obviously be possible to use more hardwoods by gradually changing and adapting the production lines now in operation. But in some cases radical changes may be needed involving investment in new lines and abandonment of some of the present products. The changes envisaged in the structure of the industry are likely to go so far that hardwood becomes the most important raw material of Minnesotan forest industry towards the end of the century. This is a matter of detailed study which can be entered upon only when the new forest inventory data are released.

So far the use of other hardwoods than aspen has not increased much. The paper birch constitutes a particular problem because it has a shorter life span than most other species. It is possible that the high rate of mortality in the Minnesotan forests largely concerns birch trees now about to reach their age limit. Special efforts are needed to find commercial uses for the "other hardwoods" group and in particular for birch. It is primarily a matter of technical and marketing research.

### 12.2 Lumber Production Development

The main characteristics of the existing sawmilling industry are:

- Sawmills are generally small, often equipped with old machinery. In many mills management, marketing and technical skills could be improved.
- Financing possibilities are not sufficient for major expansion programs.
- Higher quality products would result in more profitable sales prices.
- Further integration of sawmilling with pulping/wood-based panel manufacturing would improve the performance of the industry.
- Marketing standards could be improved; there is apparently a substantial unutilized sales potential.

In the longer run, the sawmilling industry will have to adjust its production to the changing raw material supply. Declining volumes of softwood and higher value hardwood species are to be replaced mainly by aspen.

Aspen should not represent any real problems in conversion, but many mills are apparently lacking the technical knowledge required. No doubt, the technology for processing aspen will have to be developed further.

The market prospects for Minnesotan lumber are good because of shortage of good-quality well-seasoned local lumber. Much of the demand is now supplied from remote outside sources.

### 12.3

#### Wood-based Panel Industries

In Minnesota, the most important product in this category is fiberboard (including insulating board, medium density fiberboard and speciality hardboards) which is produced in old but well-managed large mills. The market is growing and the country is a net importer of the product.

There is a small lumber-core plywood mill in Minnesota. Several studies have been carried out on the possibilities of building new mills but because of the limited availability of good quality raw material, there has not been any progress.

There is a new structural particleboard mill in Minnesota, but no production of standard particleboard.

There would seem to be a considerable potential for particleboard and fiberboard production in the state because:

- there is an abundant supply of low-grade aspen particularly suited for these products

- there are also other unwanted species that can be used as raw material
- the use of whole-tree chips represents no technical problem
- product development is relatively rapid which opens new market prospects
- capital investment requirements are much smaller than in pulp production, which competes for the same raw material

## 12.4

### Pulp and Paper Industry

The present pulp and paper capacities and their recent growth rates are estimated at:

	<u>Capacity in 1977, 1000 tons</u>	<u>Growth in 1972...77, percent/year</u>
Pulp	963	+2.2
Paper and paper-board <sup>1)</sup>	1 430	+2.5

Pulp production is almost completely integrated with paper production. Furthermore about 150 000 tons/year of chemical pulp, mostly long-fibered, is imported to Minnesotan mills from other states, which is about 15 percent of the total pulp consumption.

About half of the paper pulp capacity is mechanical pulp used for printing and writing paper production. Chemical pulp accounts for about one third and is used for woodfree printing papers. The balance is semichemical pulp used for corrugating medium.

Apart from pulp, about 200 000 to 300 000 tons of recycled fiber has been consumed in paper production. This is a fiber reserve which offers certain possibilities for expansion.

On the basis of the forest resources in Minnesota the most promising ways of raising production would be:

- chemical pulping (including bleaching) of hardwoods for woodfree fine papers, household and sanitary tissue and/or for market pulp
- mechanical pulping of aspen for newsprint and similar grades
- semichemical pulping of hardwoods for corrugating medium

<sup>1)</sup> including fiber building board

Paper and paperboard output is dominated by printing and writing papers. Fluting, folding boxboards, and some minor grades are also produced, but several essential products are missing, such as newsprint, kraftliner and other liners, sack kraft, household and sanitary tissue, etc.

In the 1970s only one new paper machine has been started up and only one major modernization carried out. The slow rate of expansion is partly explained by the heavy investments in pollution control in existing mills. Expansion plans are few and they are not likely to have any major influence on the total volume of wood consumption but rather on its structure.

The most important problem as claimed by the industry is the shortage of softwood pulpwood. It is impossible to quantify this until the new inventory results are available. Energy is the next most important concern among industry leaders.

## 12.5

### Markets for Forest Products

Minnesota is a net exporter of roundwood, the main market being Wisconsin. The outside competition for wood has been steadily increasing during the last few years in all parts of the state except the north.

The industry is marketing its products practically throughout the country with an emphasis on the Mid-Western region. This is partly explained by the fact that major plants are usually part of large national corporations, which are relatively flexible in their marketing strategy in regard to the location of markets and supplying mills.

Very few of the Minnesotan companies supply bulk products as the general strategy seems to be to specialize on a narrow quality or end-use segment in which the particular product characteristics can best be utilized.

Marketing is usually effectively arranged except for the sawmilling industry.

Markets are not likely to constitute a limiting factor for the expansion of the Minnesotan forest industry. Detailed analysis is required to determine which individual products and markets would offer the best prospects.

## 12.6

### National Competitiveness of the Minnesota Forest Industry

In roundwood equivalents, Minnesota is a net importer of forest products. On the other hand, the state is close to

a number of major national consumption centers and regions with little own forests, so substantial export markets are within reach.

The competitiveness of Minnesota cannot be reliably compared with present and potential competitors on the basis of currently available information. However, it appears reasonable to conclude that the industry so far has been competitive in its major markets. But the expected trends in wood raw material availability and cost factors may change the situation.

## 12.7

### Energy and Fuels

As its hydropower resources are limited Minnesota depends for its energy supplies mainly on thermal and nuclear power and on purchased electric power from North Dakota and Manitoba in Canada. The present supplies and expansion projects approved or in progress are sufficient to cover all power requirements until the late 1980s.

Coal, lignite and oil are now used, but the importance of coal will increase in relation to oil. The delivered present cost of Montana coal is rather low and competitive with other industrial fuels. Natural gas is still available for the industry but in limited volumes only. In the future it will mainly be used as residential fuel and, consequently, the industry will have to replace it.

Studies are in progress on the possibilities of using residues, low-grade roundwood and peat for the generation of power. But these fuels are not expected to be competitive with the traditional industrial fuels in the foreseeable future, except in a few special cases.

After the oil crisis in 1973, wood has gained a new foothold for heating houses, particularly in the northern parts of the state. This use should be vigorously promoted to open an outlet for the excessive supply of small-size and low-quality wood. The present regulations, which now seem to hamper the building of wood-heated houses, obviously need to be reviewed.

TIMBER BASE AND UTILIZATION IN MINNESOTA AND THE LAKE STATES IN 1970<sup>1)</sup>

	<u>Minnesota</u>	<u>Michigan</u>	<u>Wisconsin</u>	<u>Lake States</u>	<u>United States</u>
Commercial forest land, 1000 acres	16 875	18 800	14 536	50 840	499 697
Growing stock volume					
- cu ft per acre	695	881	785	788	1 299
- softwood percentage	33	26	23	25	67
Net growth					
- cu ft per acre	27.0	32.2	34.6	31.0	37.2
- softwood percentage	29	27	26	25	57
Removals					
- cu ft per acre	9.2	11.3	21.3	13.4	28.1
- softwood percentage	45	26	13	24	69
- percent of net growth	34	35	62	43	76

1) Source: The Outlook for Timber in the United States, FFR -20