

# **Minnesota's County Forests: A Delphi Study of Options for Program Funding, Sale of Timber, and Land Ownership**

**MELVIN J. BAUGHMAN  
PAUL V. ELLEFSON**

**1983 STATION BULLETIN 553  
ITEM NO. AD-SB-2194  
AGRICULTURAL EXPERIMENT STATION  
UNIVERSITY OF MINNESOTA**

# Contents

	Page
INTRODUCTION .....	1
Historical Perspective .....	1
Importance of County Land .....	2
Administration of County Land .....	3
Major Policy Issues .....	3
STUDY DESIGN .....	4
Objectives and Procedure .....	4
Panel Selection .....	5
FUNDING FORESTRY PROGRAMS .....	8
Existing Funding Sources .....	8
Alternative Funding Sources .....	10
Funding Programs—Delphi Results .....	11
Policy Implications .....	15
TIMBER SUPPLY AGREEMENTS .....	16
Existing Timber Supply Agreements .....	17
Alternative Timber Supply Agreements .....	20
Timber Supply Agreements—Delphi Results ..	22
Policy Implications .....	26
FOREST LAND OWNERSHIP .....	27
Existing Land Ownership Policies .....	27
Alternative Land Ownership Policies .....	29
Land Ownership Policy Options—Delphi Results .....	30
Policy Implications .....	34
SUMMARY AND CONCLUSIONS .....	35
Funding Plans—Summary .....	35
Timber Supply Agreements—Summary .....	35
Land Ownership Policies—Summary .....	36
Conclusions .....	37
Use of Study .....	38
BIBLIOGRAPHY .....	39
APPENDIX	
County Forest Land Ownership Policies by Factor Influencing Retention-Disposal, 1980 .....	41

## List of Tables

	Page
1. Productivity class distribution and net growing stock volume in 1977, and timber volume harvested in 1975, on commercial forest land in Minnesota for different ownership classes. ....	2
2. Classification of county land by use and retention/disposal, 1978 .....	3
3. Source and distribution of county land management revenue, 1979 .....	3
4. Occupational groups and roles of delphi panel members .....	5
5. Major funding sources for county management of nonconservation areas, 1980 .....	9
6. Timber sale procedures by county, 1980 ....	18
7. Relative importance of factors which influence county land ownership decisions .....	28

## List of Figures

	Page
1. Tax-forfeited acres sold by and acres forfeited to northern Minnesota counties (excluding St. Louis) .....	1
2. Minnesota counties with substantial areas of tax-forfeited land, 1978 .....	2
3. Administrative organization of county forestry programs in Minnesota .....	4
4. County-administered forest land: major public policy issues .....	6

This research was supported by the College of Forestry and the Agricultural Experiment Station, University of Minnesota, St. Paul, and the Regional Economics of Forest Resources Work Unit, North Central Forest Experiment Station, USDA-Forest Service, Duluth.

# Minnesota's County Forests: A Delphi Study of Options for Program Funding, Sale of Timber, and Land Ownership

Melvin J. Baughman  
Paul V. Ellefson

## Introduction

Minnesota county governments manage a large area of forest land, which, along with its associated natural resources, provides revenue to local governments, employment for the region's economy, and public recreation opportunities for the entire state. Changes in county policies may have significant impacts on these and other outputs. Therefore, before land management policies are altered, it is important to explore all reasonable alternatives and attempt to project their impacts.

This study focused on three forest land management policy issues of concern to Minnesota counties: (a) funding of county land management programs; (b) timber sale options, especially long-term timber sale agreements; and (c) county land ownership policies. The overall objectives were to *identify existing county policies for each issue*, to *generate new policy alternatives*, and to *describe the likely impacts* of these hypothetical policies. Impacts on county governments, on the timber industry, and on nontimber outputs were evaluated. A more detailed description of the study is contained in Baughman (1982a).

## Historical Perspective

More than 99 percent of county-administered land actually belongs to the state, which acquired it from private owners who forfeited land when they were unable to pay property taxes (Minn. Dept. Natural Resources, 1978).

Tax forfeiture arose in the wake of logging and agricultural activities which characterized northeastern Minnesota in the late 1800s. Although early settlers were generally farmers, the severe climate, poor transportation system, and depressed economy were serious impediments to agriculture. By 1860 the state began to

accumulate land forfeited by settlers unable to pay taxes. Although the state retained title to the land, county governments administered it and retained most revenues.

During the 1800s and early 1900s, it was clearly the policy of the state and county governments to return tax-forfeited land to private ownership. Despite this policy, counties administered more than six million acres in the 1930s (Dana et al., 1960). Land was forfeited to the counties faster than they could dispose of it.

By 1960, a trend toward retention of large acreages of this land in public ownership was evident (Dana et al., 1960). From 1962 through 1974, the acreage sold by counties exceeded the acreage forfeited (Figure 1). The acreage sold annually, however, declined from a peak of more than 100,000 acres sold in 1962 to slightly more than 10,000 acres sold in 1974. According to county land commissioners interviewed during the course of

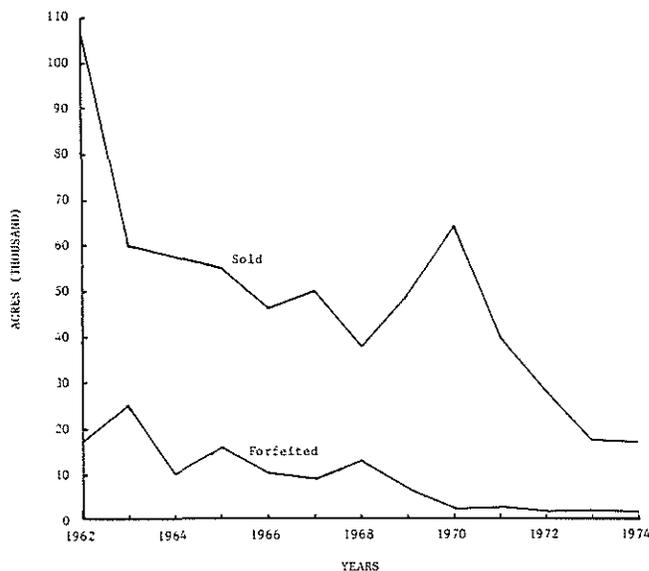


Figure 1. Tax-forfeited acres sold by and acres forfeited to northern Minnesota counties (excluding St. Louis). Source: Lothner et al., 1978a.

**MELVIN J. BAUGHMAN** is an assistant professor and program leader for Renewable Resources Extension, College of Forestry, University of Minnesota.

**PAUL V. ELLEFSON** is a professor of Forest Economics and Policy, College of Forestry, University of Minnesota.

this study, sales of tax-forfeited land have continued to involve relatively small acreages since 1974. About 2.8 million acres of tax-forfeited land are now administered by 17 northeastern counties (Figure 2).

### Importance of County Land

Eighty-two percent of county land is now covered by commercial forest (compiled from Jakes and Raile, 1980; Spencer and Ostrom, 1979; Vasilevsky and Hackett, 1980). Minnesota has more acres of county-administered commercial forest than any other state (U.S. Forest Service, 1978).

County governments control 20 percent of the commercial forest land<sup>1</sup> and 21 percent of the net growing stock of timber in northeastern Minnesota (Table 1). Despite the high volume of growing stock, counties harvest less pulpwood, sawlogs, fuelwood, posts, and poles than the average for all forest owners (Table 1). Only in the fuelwood and "other" categories do counties exceed the harvest level for any other single ownership class. It should be noted that this harvest information does not take into consideration possible

<sup>1</sup>Administration of commercial forest land in Minnesota's 17 northeastern counties in 1977 was distributed as follows (thousand acres): federal, 2,302.6; state, 2,360.8; county and municipal, 2,282.6; forest industry, 768.5; and other private, 3,495.3. Compiled from Jakes and Raile (1980) and Spencer and Ostrom (1979).

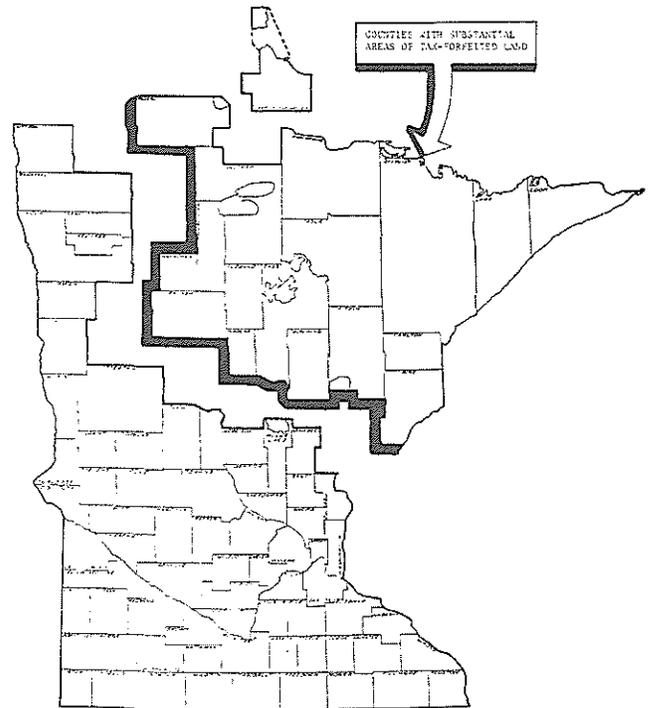


Figure 2. Minnesota counties with substantial areas of tax-forfeited land, 1978. Source: Minn. Dept. Natural Resources (1978).

Table 1. Productivity class distribution and net growing stock volume in 1977, and timber volume harvested in 1975, on commercial forest land in Minnesota for different ownership classes. Source: Jakes and Raile (1980); Spencer and Ostrom (1979).

Productivity Class	Ownership Class					
	Federal	State	County and Municipal	Forest Industry	Other Private	All Owners
	Percent					
<i>Distribution<sup>a</sup></i>						
165-225 <sup>b</sup>	<1	<1	<1	<1	0	<1
120-165	<1	1	2	2	1	1
85-120	11	14	20	21	18	16
50-85	39	26	39	30	40	36
20-50	49	59	39	46	41	46
<i>Net Growing Stock Volume<sup>a</sup></i>	Thousand Cubic Feet					
Softwoods	1,050,516	804,850	563,668	264,744	712,611	3,398,389
Hardwoods	1,291,637	934,034	1,403,940	369,514	2,147,455	6,146,580
All Species	2,342,153	1,738,884	1,969,608	634,258	2,860,066	9,544,969
<i>Timber Volume Harvested per Thousand Acres<sup>a</sup></i>						
Pulpwood (cords)	81	122	78	225	113	109
Sawlogs (bd.ft.)	7,957	16,831	6,500	7,512	12,480	10,909
Fuelwood (cords)	17	3	4	.8	28	14
Posts	47	304	35	444	334	215
Poles (pieces)	2	12	.2	0	20	9
Other (cu. ft.)	466	228	451	476	538	436

<sup>a</sup>Includes aspen-birch and northern pine units from Minnesota Forest Survey.

<sup>b</sup>Cu.ft. of growth/acre/yr.

differences in timber size classes, species composition, and accessibility of timber, all of which could influence harvest levels; however, 61 percent of county forests are on sites capable of producing more than 50 cubic feet of wood per acre per year—the highest percentage of any ownership class.

Many counties have inventoried and classified their land according to its “highest and best use” (Table 2). Each classification is a recommendation for what the principal land use *should be* and does not necessarily reflect *current* land use. Land is also classified according to whether land should be retained or disposed of; nearly all county land is classified for retention and subsequently for natural resource conservation purposes (Table 2).

Counties earned approximately \$3.4 million through the sale of land, timber, and related products in 1979 (Table 3). Timber sales accounted for nearly half of the total land-based revenue. The largest single allocation of this income was for reinvestment in county land administration. Schools, township governments, and many county programs also benefited from these revenues.

### Administration of County Land

Tax-forfeited land is legally owned by the state, but county governments have primary responsibility for its management (Minn. Stat. §§282.01 [1], [2]). Each county has a board of supervisors which establishes overall policies for county land management within the limits of state law. The day-to-day administration of land is supervised by a county land commissioner or a county auditor.

Currently, 14 counties have land commissioners appointed by their county boards of supervisors to three-

**Table 2. Classification of county land by use and retention/disposal, 1978. Source: Minn. Dept. Natural Resources (1978).**

Classification Category	Acres
<i>Use Classification</i>	
Multiple use conservation	2,393,483
Recreation or aesthetic	125,315
Fish and wildlife	82,462
Commercial peat or gravel	59,175
Agricultural	44,347
Access to water or public land	41,307
Mining	10,825
Urban	5,826
None listed	64,299
<b>TOTAL</b>	<b>2,827,039</b>
<i>Disposal/Retention Classification</i>	
Retain for conservation	2,169,884
Retain for other purposes	41,513
Provisional	203,604
Disposal by sale	244,477
Disposal by exchange	102,024
None listed	65,419
<b>TOTAL</b>	<b>2,826,921</b>

**Table 3. Source and distribution of county land management revenue, 1979. Source: Kobs (1979).**

Revenue Item	Amount <sup>a</sup>
<i>Source of Revenue</i>	
Timber sales (stumpage, firewood)	\$1,567,189
Land sales (timber, land, buildings)	1,355,226
Miscellaneous (leases, gravel, deed payments)	480,816
<b>TOTAL REVENUE</b>	<b>\$3,403,231</b>
<i>Distribution of Revenue</i>	
County land administration	\$1,326,359
Schools	485,132
Townships	363,848
County government	363,848
County memorial forest land	251,967
County timber development fund	229,188
County recreation	206,108
County development fund	127,056
Other (miscellaneous county funds)	49,725

<sup>a</sup>Revenue figures are approximate. Includes only revenue derived from sale of county land and goods and services from county land.

year terms.<sup>2</sup> Their duties vary among counties, but usually encompass some combination of the following programs (McCann and Ellefson, 1980):

- Forestry
- Fish and wildlife management
- Parks and recreation development
- Soil and water conservation
- Surveying
- Engineering
- Administration of leases, easements, and land sales

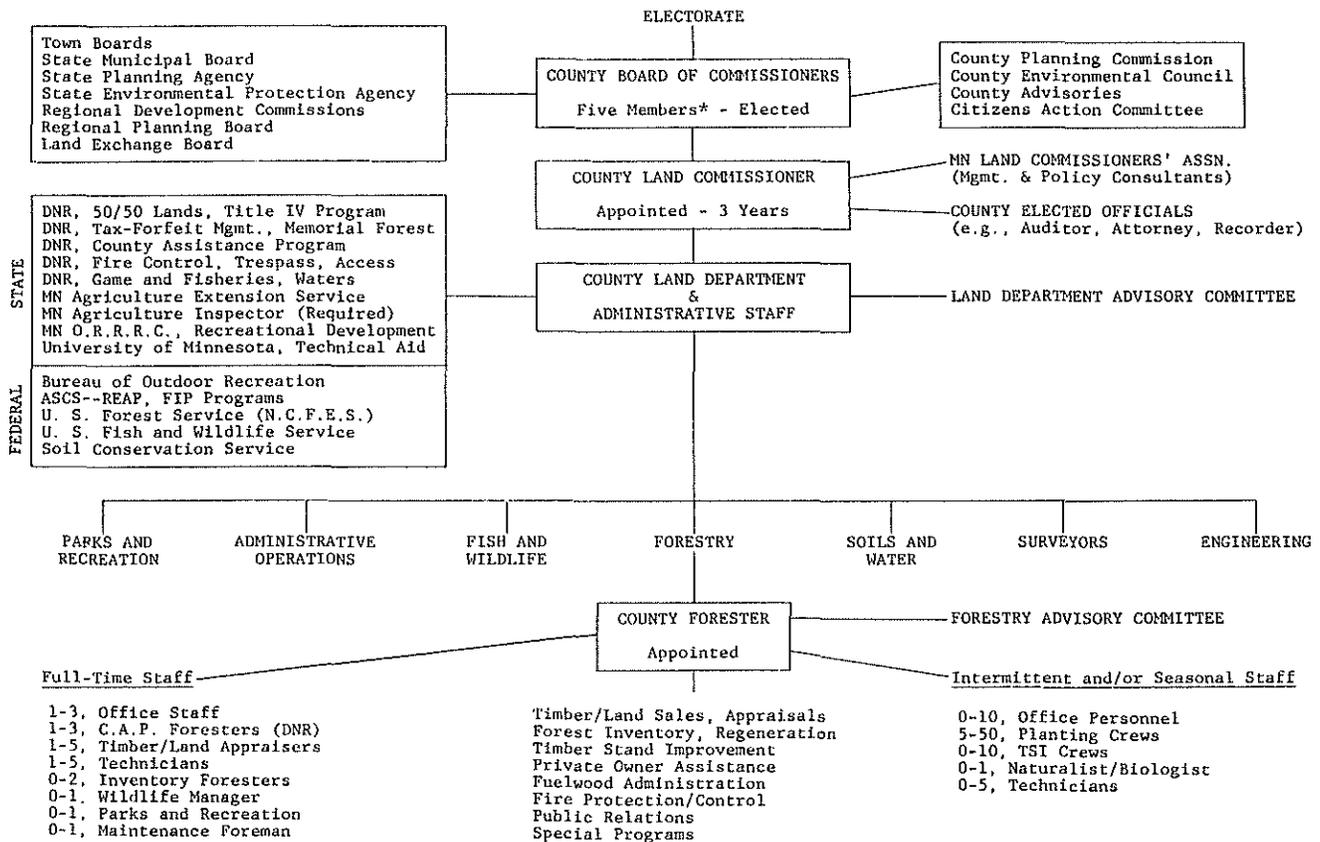
Ninety-eight percent of all tax-forfeited land in Minnesota is managed by county land commissioners (Minn. Dept. Natural Resources, 1978). County land department organization and relationship to other agencies is shown in Figure 3. County auditors administer land in three counties<sup>3</sup> comprising less than 2 percent of all tax-forfeited land (Minn. Dept. Natural Resources, 1978). The auditor is an elected official somewhat independent of the board of supervisors, and is the chief accountant and comptroller for the county. Auditors provide only custodial land management, especially with regard to forestry (Lothner et al., 1978a).

### Major Policy Issues

County boards of supervisors, land commissioners, and auditors exercise broad discretionary power over the management and use of county land. Problems faced by these policymakers are complex. In general, they can

<sup>2</sup>Counties which have a land commissioner are Aitkin, Becker, Beltrami, Carlton, Cass, Clearwater, Crow Wing, Hubbard, Itasca, Koochiching, Lake, Pine, and St. Louis. Cook County has a county assessor who performs many of the usual functions of a land commissioner.

<sup>3</sup>Mahnomen, Roseau, and Wadena Counties.



\*Except for St. Louis and Ramsey Counties, where the board is composed of seven members.

Figure 3. Administrative organization of county forestry programs in Minnesota. Source: McCann and Ellefson, 1980.

be aggregated into three broad issue areas: *retention versus disposal* (i.e., should county forest land be retained or disposed of?), *disposal of land* (i.e., if disposed of, who should receive the land and how should the disposal be implemented?), and *retention of land* (i.e., if retained, what type and level of outputs should be produced, how should investments be funded and projects implemented, and what procedures should be followed for distributing the forest outputs produced by county programs?). Figure 4 illustrates the numerous policy questions within these three major issue areas.

## Study Design

### Objectives and Procedure

Three policy issues having a substantial influence on the level of timber production on county land and of concern to county policymakers were selected for study: funding of county land management, county timber sale agreements, and county land ownership. The study's objectives were to (a) identify current state and county policies on these issues, (b) identify a broad range of alternative policies which policymakers may

want to consider, and (c) obtain the opinions of knowledgeable persons about the potential impacts of these alternative policies on county government, on the timber industry, and on nontimber outputs.

Current state policies guiding county operations were obtained from a review of state laws and state agency reports. Only laws and reports in effect as of January 1, 1981 were considered. Policies and procedures followed by individual counties were obtained by interviewing land commissioners in 14 counties<sup>4</sup> using a written questionnaire. Interviews were not conducted in the three counties which have county auditors directly administering land, since these control relatively small acreages and are not actively involved in timber management.

Alternative policies were derived in two ways. First, existing literature provided sufficient information to develop several new policies for each issue. Designed to

<sup>4</sup>Commissioners were interviewed in Aitkin, Becker, Beltrami, Carlton, Cass, Clearwater, Crow Wing, Hubbard, Itasca, Koochiching, Lake, Pine, and St. Louis Counties. The assessor was interviewed in Cook County because he performs many of the functions of a land commissioner.

stimulate increased timber production on county land, the alternatives were drafted to represent extreme points of view. Second, a delphi questionnaire was used to generate additional policy alternatives. The delphi process was also used to determine possible impacts of alternative policies.

The delphi process is a method of structuring communication to enable a group of individuals to analyze a complex problem and attempt to reach a consensus about its solution. The delphi begins by soliciting information and opinions from a carefully chosen panel. Responses of other panel members are given as feedback to each participant, who then has an opportunity to re-analyze the problem and provide another response. The process is repeated for a fixed number of rounds or until opinion converges. Participants usually remain anonymous to one another (Dalkey and Helmer, 1963; Gordon and Helmer, 1964; Linstone and Turoff, 1975).

The delphi method was applicable to study of county forest policies for the following reasons:

- *Complex Issues.* The policy options considered involved an extremely complex set of consequences. Precise analytical techniques were not appropriate. Decisionmakers benefited from subjective judgments by informed individuals made on a collective basis.
- *Inadequate Communications.* The individuals examining policy options had diverse experience and expertise, but lacked a history of adequate communication among themselves or with county governments.

- *Sensitive Subjects.* Disagreements among individuals over forest policy issues were known to be severe. Stakeholders were not likely to participate in open debate. The issues could be discussed only if the communication process was refereed and confidential.

- *Strong Personalities.* Domination of policy discussions by a majority or by strong personalities was a possibility. Communication had to be structured so as to avoid such an occurrence.

- *Interaction Difficulties.* More individuals were needed than could effectively interact in a face-to-face exchange.

- *Travel Constraints.* The lack of travel time available to participants and the high cost of frequent group meetings prohibited personal interaction.

The delphi process used in this study involved three rounds of questionnaires sent to a carefully selected panel of persons considered to be knowledgeable about the issues in question.

### Panel Selection

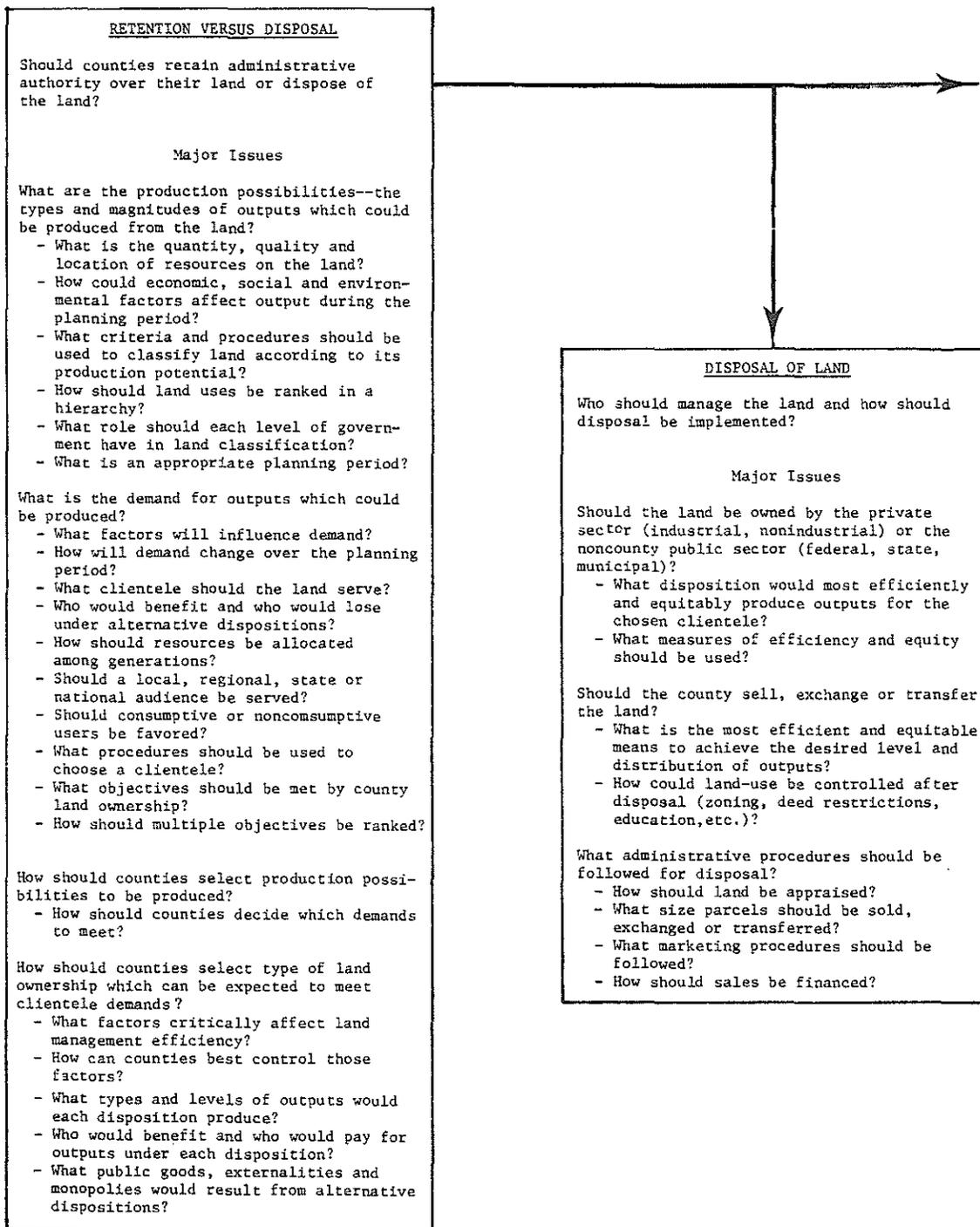
The validity of information obtained through a delphi process is largely dependent on the panel members involved (Mitroff and Turoff, 1975). To obtain divergent points of view, panel members were selected from 12 major occupational groups (Table 4).

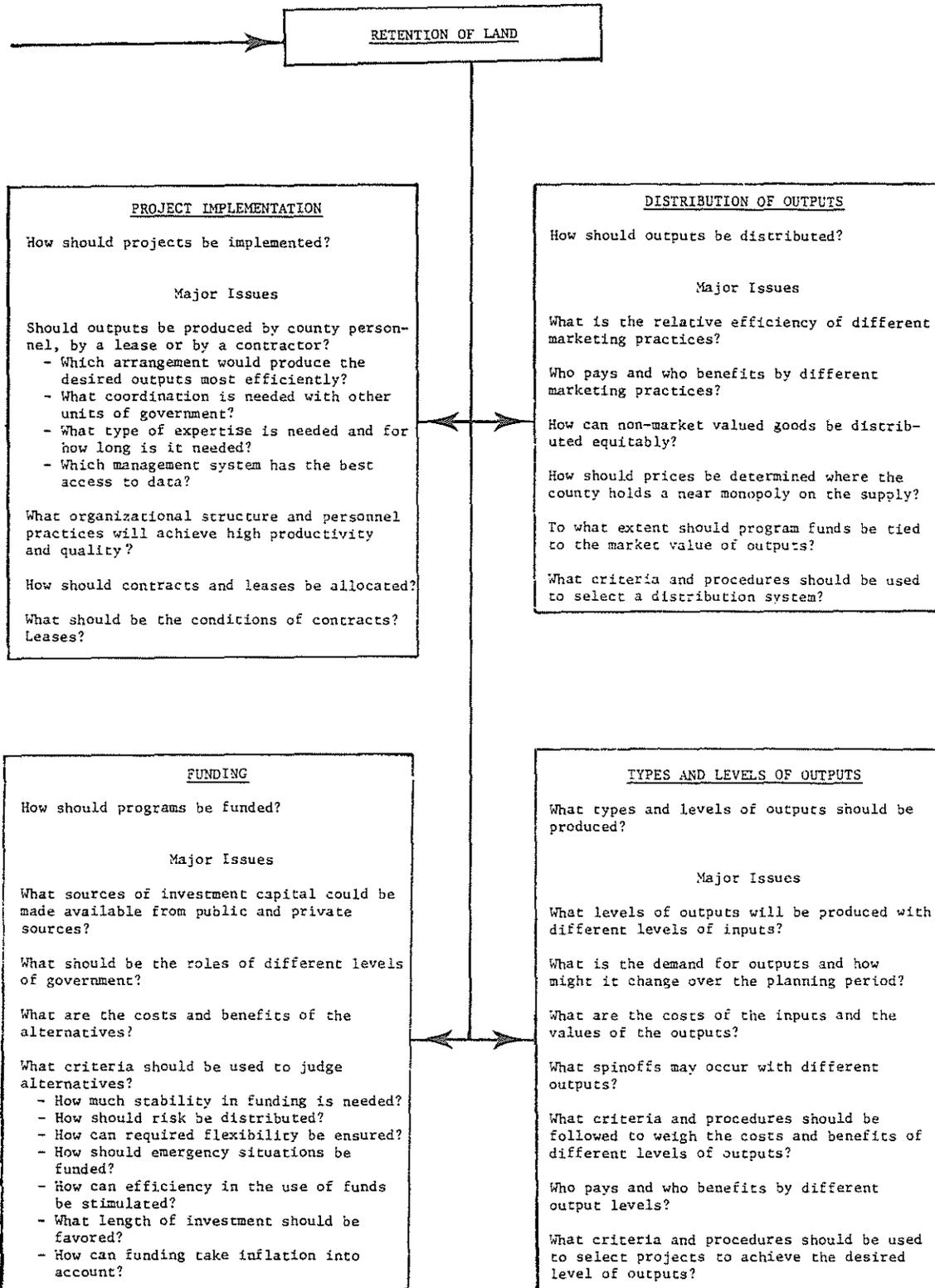
The 12 occupational groups were selected to ensure that the panel included experts, stakeholders, and facilitators (Scheele, 1975). *Stakeholders* are persons directly affected by the policies being studied: county land managers, administrators of land intermingled with

Table 4. Occupational groups and roles of Delphi panel members

Occupational Group	Roles				
	Stakeholders	Experts			Facilitators
		Funding	Timber Sales	Land Ownership	
• County land commissioner from northern Minnesota	X	X	X	X	X
• County auditor from northern Minnesota		X		X	
• State land management agency administrator from Minnesota	X	X	X	X	X
• State natural resource agency staff from Minnesota		X	X	X	
• National forest administrator from Minnesota	X	X	X	X	
• State and county finance researcher			X		X
• Timber sales policy researcher			X		X
• Public land ownership policy researcher				X	X
• Economic development researcher from Minnesota			X	X	
• Timber processing industry manager from northern Minnesota	X		X	X	
• Independent logger from northern Minnesota	X		X	X	
• Environmental lobbyist from Minnesota	X		X	X	

Figure 4. County-administered forest land: major public policy issues.





county property, and persons consuming outputs from county land, such as timber industry managers and recreationists. *Experts* are individuals with special knowledge or experience which enables them to develop new alternatives and analyze policy impacts. They are persons administering the policies being studied, persons engaged in policy research, or persons directly affected by the policies and subsequently knowledgeable about them. *Facilitators* are persons that have skills in clarifying, organizing, and synthesizing information, as well as stimulating the imagination of other panel members. Such individuals need not be associated with any particular occupation.

A list of potential panel members was solicited from a variety of sources, including university faculty members, state agency persons, and panel members themselves. In addition to requiring a personal recommendation from one of these contacts, a panel member had to be able to understand policies, foresee their consequences, and communicate ideas in writing. Each member also had to be reasonably familiar with county forestry programs in Minnesota, although exceptions were made when divergent opinions and possibly creative, new ideas were sought. Panel members had to be knowledgeable about at least one of the issues under study. Prospective panel members were judged on the above criteria on the basis of personal references and occupation. Finally, the candidate had to be interested in the study. Telephone contacts with prospective panel members confirmed this interest.

## Funding Forestry Programs

### Existing Funding Sources

The intensity of forest management on Minnesota county land is largely dependent on available funding; the level of funding in turn depends upon both the types of funding sources and county board allocations of discretionary monies to forestry programs. Support for forestry differs among counties and varies with the composition of county boards and pressure groups.

According to statute, county tax-forfeited land is classified as either Consolidated Conservation Area land or Nonconservation Area land, depending on the set of laws by which the land title reverted to state ownership. The sources of funds which counties are authorized to use for management of these two types of land differ.

Consolidated Conservation Area land was acquired by the state in the early 1930s when landowners failed to pay tax assessments levied against their land for construction of drainage ditches. Large-scale tax forfeiture stopped construction of those ditches. The state then acquired this land for forestry and watershed control purposes (Minn. Statutes §§84A.20-.42). County governments now administer sale of this land but the state manages the land.

Receipts from sale or rental of Conservation Area land and from sales of products from it are divided

between the state and county. Before these funds are divided, counties may transfer the following administrative expenses to their general revenue funds:

- Cost of giving notices regarding land sales.
- Per diem and vehicle mileage owed to county board members for duties related to this land.
- Salaries of a county auditor and treasurer for additional duties related to this land.
- Cost of equipment, supplies, and clerk salaries needed by a county auditor for this land.
- Land commissioner's expenses associated with land classification and appraisal of this land.

Four counties, Aitkin, Koochiching, Mahnomon, and Wadena, received money for administering sales of Conservation Area land in 1979.

In addition to recovering sale costs, counties receive 50 percent of the gross receipts from Consolidated Conservation Areas (Minn. Statutes §84A.51). This money is apportioned as follows:

- 30 percent to a county development fund to develop that portion of the county within the Conservation Area.
- 40 percent to the capital outlay fund of the school district.
- 20 percent to the county general revenue fund.
- 10 percent to the township road and bridge fund; if a township is unorganized, this portion is credited to the county general revenue fund.

The second category of tax-forfeited land, Nonconservation Area land, includes all land forfeited for nonpayment of property taxes. Most county-administered land falls into this category.

Counties have many sources of revenue which can be used for management of Nonconservation Area land (Table 5). A very important source in most counties is income from the sale or rental of tax-forfeited land and from the sale of any products from the land. This revenue is deposited in a forfeited tax sale fund from which all disbursement must be approved by the county board. The following types of expenses may be paid from this fund (Minn. Statutes §282.09):

- Per diem and expenses incurred by county board members (Minn. Statutes §375.055 [1]).
- Salaries of a land commissioner and assistants.
- County auditor's expenses for issuing certificates of sale and contracts for deeds and leases.
- Salaries of clerks needed by a county auditor or land commissioner.
- Fees paid to the state commissioner of revenue for issuing land sale deeds.
- Repair costs for sewers or water mains found along property lines of tax-forfeited land.
- Acquisition and maintenance costs for equipment used to maintain and improve tax-forfeited land.
- Noxious weed control costs on tax-forfeited land.

Any revenue remaining after the above disbursements is apportioned in the following sequence (Minn. Statutes §282.08):

1. After land sale, municipal subdivisions (including incorporated counties, towns, cities, and school districts) are paid for increases in land value attributed to public improvements they made on the land after the title was forfeited to the state.
2. Municipal subdivisions are paid for special assessments charged against the land for drainage or other purposes at the time the land was forfeited.
3. Any balance is distributed as follows:
  - a. The county board may annually set aside up to 30 percent of the remaining receipts for timber development on tax-forfeited land. The county board and state commissioner of natural resources must approve all projects.
  - b. Up to 20 percent of the balance remaining may be appropriated annually by the county board for the acquisition and maintenance of county parks and recreation areas.
  - c. Any balance remaining after allocations are made to timber development and recreation is apportioned to the county (40%), town or city (20%), and school district (40%). If a township is not legally organized, then the county retains that portion of the funds which would have gone to the township.

If a county wishes to intensify forest management but does not want to be limited to 30 percent of its net proceeds as described in 3a above, then the county may designate land suited for forestry purposes as a memorial forest (Minn. Statutes §459.06 [2]). Up to 100% of

the income from the memorial forest may then be expended from the forfeited tax sale fund for the maintenance and development of the dedicated forest. Approximately 47 percent of all county-administered, tax-forfeited land is in dedicated memorial forests (Minn. Dept. Natural Resources, 1978).

Another source of money available to counties for development of timber and other forest resources is a property tax levy (Minn. Statutes §282.38 [2]). This money may be expended on both memorial forests and other county forest land. Three counties use a property tax to fund forestry projects; only one county relies on it as the major source of forestry funding (Table 5).

The state government contributes directly to management of county land by providing technical forestry assistance. When a county designates a portion of its net proceeds for timber development, the county may request that the state commissioner of natural resources provide either technical assistance or matching funds for timber development (Minn. Statutes §282.38 [1]). Seven counties have foresters employed by the Minnesota Department of Natural Resources (DNR) who provide technical assistance under this program (Table 5).

The state's major subsidy to county land management is the in-lieu tax payment made to each county. The state may annually contribute 75¢ per acre of tax-forfeited land to counties which administer this land. Part of this revenue (37.5¢ per acre) is to be used for resource development, forest management, game and fish habitat improvement, and recreation development

**Table 5. Major funding sources for county management of nonconservation areas, 1980.**

County	Funding Source											
	Sale of Land and Products		Memorial Forest Receipts		Property Tax Levy		County Technical Assistance Program		Payments in Lieu of Taxes		BWCAW <sup>a</sup> Federal Grant	
	T <sup>b</sup>	NT <sup>c</sup>	T	NT	T	NT	T	NT	T	NT	T	NT
Aitkin	X	X	X	X		X		X		X	X	X
Becker	X	X	X	X				X		X	X	X
Beltrami	X	X	X	X				X		X	X	X
Carlton					X	X				X	X	X
Cass	X	X								X	X	X
Clearwater	X	X	X	X						X	X	X
Cook						X					X	
Crow Wing	X	X	X	X				X		X	X	X
Hubbard	X	X	X	X						X	X	X
Itasca	X	X	X	X				X		X	X	X
Koochiching	X	X								X	X	X
Lake	X	X	X	X				X		X	X	X
Pine		X								X	X	X
St. Louis	X	X	X	X				X		X	X	X

Note. Information is from interviews with county land commissioners.

<sup>a</sup>Boundary Waters Canoe Area Wilderness

<sup>b</sup>T=timber; these sources of funds are used for timber management.

<sup>c</sup>NT=nontimber; these sources of funds are used to manage nontimber outputs such as recreation and wildlife.

and maintenance on tax-forfeited land (Minn. Statutes §§477A.11-.14). All counties considered by this study received these payments (Table 5).

The federal government's most significant contribution to county land management is a grant to develop renewable resources, especially softwood timber (16 U.S.C.A. §1601). From 1980 through 1990, Congress is authorized to appropriate up to \$3 million annually for management of state, county, and private land surrounding the Boundary Waters Canoe Area Wilderness (BWCAW). Federal grants may not exceed 80 percent of the total cost of the project. The state allocates a portion of these funds among the counties and provides the 20 percent matching money (Table 5).

The funding sources listed above are the major, enduring sources available to counties. In addition, counties occasionally obtain funds from other sources for relatively short periods of time. These sources include the following:

- Agricultural Conservation Program, a federal cost-share program used to pay for tree planting (16 U.S.C.A. §§1501-1503).
- Comprehensive Employment and Training Act, a federal jobs program which permits hiring of local residents for a variety of tasks from office work to tree planting (29 U.S.C.A. §§801-992).
- Governor's Youth Program (Title IV) (Kobs, 1979).
- Minnesota Department of Natural Resources Grant-in-Aid for trail development and maintenance.
- Foundation grants to be used for reforestation and afforestation of softwoods.
- Taconite Mining Tax Fund (Kobs, 1979).
- County General Fund.
- Legislative Commission on Minnesota Resources Grant-in-Aid for timber inventory.

## Alternative Funding Sources

The complex system used to fund county land management has evolved over more than a century. Funding legislation has been enacted in a piecemeal fashion; there is no concise record of the alternative funding sources which were considered at the time funding laws were passed. Since adequate funding is essential to good land management, a literature search was carried out to uncover a wide variety of funding sources which policy-makers may want to consider in the future. Although some may be contrary to state statutes or to the Minnesota State Constitution, they are included here to provide the broadest possible range of alternatives.

**County Government.** All land management could be funded by annual appropriations from the county general fund—a melting pot of money that includes revenue from sale or rental of land and sale of products and services from the land (Aubertin, 1966). If this were done, the county board would have maximum flexibility to allocate money among alternative programs, but land management funding levels might fluctuate widely in response to changes in the makeup of the county board or to changes in the influence of pressure

groups. Fluctuations in funding levels might be reduced if county land departments were guaranteed a fixed minimum level of funds from the general fund each year, with variable appropriations made to cover expenditures which exceed that minimum.

Since forestry projects involve long investment periods and a sequence of widely-spaced investments may be needed to maximize return on the investment (e.g., site preparation, planting, thinning, harvesting), it may be advantageous for county boards to require work plans and then guarantee funding throughout the duration of a project (Mutch, 1967; Seth and Rao, 1970). This procedure would reduce future funding flexibility of county governments, and some periodic review of the development plan and financial commitment may be needed. The federal Knutson-Vandenberg Act (16 U.S.C.A. §576b) is a variation of this idea. It permits the U.S. Forest Service to collect a fee from timber buyers equal to the cost of regenerating the timber stands which are harvested. This money can be spent only for reforestation. Counties also could consider requiring timber buyers to perform regeneration work such as site preparation and tree planting as partial payment for timber harvested (U.S. Congress, 1979).

Forests are subject to natural disasters which occur on an irregular basis. It may be appropriate to have a small contingency fund to pay for suppression, damage appraisal, salvage, and regeneration of forests after large-scale disasters. Fires, insect infestations, disease outbreaks, wind storms, floods, and other disasters may be included under this fund.

If counties wish to compare the costs and benefits of land management programs, they could set up a revolving fund (U.S. Bureau of the Budget, 1960). Any revenue generated from land rental or from the sale of goods and services derived from the land would be put into this fund. Money earned from the land could then be reinvested in land management. The county board could still control appropriations from this fund and set limits on the amount of money to be reinvested or establish a time limit during which funds would be reserved for land management expenses. Any unappropriated funds left after that time would be transferred to the general fund (U.S. Congress, 1969). Such revolving funds tend to focus management on income-generating activities.

Counties may want to supplement a land management revolving fund with revenue from the county general fund to provide for non-income producing outputs such as recreation, aesthetics, wildlife, and water quality (Rodger, 1964; Seth and Rao, 1970).

Counties could also charge user fees to recover costs of goods and services such as campgrounds, public use maps, boat launch facilities, swimming areas, and hunting and fishing access. User fees are appropriate where costs of administering them are less than the revenue generated from collecting the fees (Bingham, Hawkins and Hebert, 1978; Netzer, 1969).

Land sales generate large amounts of money in some counties. This revenue could be placed in the general fund or a revolving account for land management, or it could be invested. If it were invested in dividend- or interest-earning accounts, only the earnings would be spent.

Earmarking allows a county board to specify where particular types of revenue are to be spent without going through the usual appropriation process (Bingham et al., 1978). Counties could earmark user fees to produce the kinds of outputs for which they initially were charged. Taxes also could be earmarked for land management programs. For example, a portion of real estate taxes, which are levied in all counties, could be designated for county land management. A tax on tangible personal property such as chain saws, log loaders, log trucks, and portable wood processing equipment could be earmarked for county forestry programs upon which the forest industry depends. Income taxes, either personal or corporate, could be earmarked for county programs which do not generate much revenue. A portion of a sales tax also could be earmarked for county land management. This might be a general sales tax or a tax on specific commodities such as forestry equipment, recreation equipment, or luxury items (Seth and Rao, 1970; U.S. Congress, 1979).

Counties could borrow money to cover major land management expenses (e.g., tree planting, timber stand improvement, and construction of forest access roads) which are expected to yield an income over time. Potential lending institutions include banks, insurance companies, and state government (Seth and Rao, 1970, Wis. Statutes §28.11 [8]). Revenue bonds also could be sold to generate capital for investment in land management.

**State Government.** There is a wide variety of mechanisms by which the state can transfer money to counties for land management.

Direct grants are one such funding method (Rodger, 1964; Netzer, 1969). Grants may be given for general county programs or specific outputs, and may or may not require matching funds. Criteria for allocating grants include number of acres of county land, size of county population, cost of producing selected outputs which benefit the statewide public, or a benefit-cost ratio. Grants also can be divided equally among counties, or between the DNR Division of Forestry and county governments on the basis of which entity had the best plans for use of the money according to given criteria (George Banzhaf & Company, 1980).

The state also could make loans to counties, as is the case in Wisconsin (Wis. Statutes §28.11 [8]). Loan interest rates could range from zero to competitive market rates.

Technical assistance for timber management, land classification, timber inventory, project evaluation, or other projects for which counties need only occasional expertise is another category of state aid. The state also might provide counties with services in which economies of scale would reduce costs (Bingham et al. 1978). These services might include fire control, data processing, and insect and disease surveillance.

Earmarked state taxes also could be used to subsidize county land management (Bingham et al., 1978). There are individual and corporate income taxes, as well as general and specific sales taxes. The state could turn these funds over to counties as payment for benefits

received from county lands by the statewide public or, if there are economies of scale which permit the state to collect taxes with lower administrative costs than counties would incur, the state may serve as simply a collection agency on behalf of the counties. Taxes would be simply passed through the state to county governments (Netzer, 1969).

The state could also consider funding research which would benefit not only counties, but other forest landowners in the state (Rodger, 1964).

**Federal Government.** The federal government has a relatively minor interest in county land management; nevertheless, there may be some obligation to the counties, since goods or services produced on county land could potentially benefit a multi-state or national audience.

Grants targeted at specific outputs (e.g., the Forestry Incentives Program, 16 U.S.C.A. §2103) are one form of federal aid (Browning and Browning, 1979). Grants may or may not require matching funds. A system of loans might serve a similar purpose; the federal government, for example, now provides guaranteed loans to farmers for various farm enterprises (U.S. Department of Agriculture, 1978). A forestry loan program has not yet been initiated, but such a program might be used by counties.

The federal government could also provide training programs or technical assistance directly to counties or indirectly through the DNR Division of Forestry. Federal research also benefits counties and may help a wide variety of other landowners in the region.

Federal crop insurance could be expanded to include coverage for timber. This might reduce the financial risk associated with timber management over long periods of time (U.S. Department of Agriculture, 1978; 7 U.S.C.A. §1508).

## Funding Programs—Delphi Results

Actual funding plans can be extremely complex. In the delphi process, however, plans had to be condensed to brief outlines so panel members could quickly grasp differences. Although definitions of funding alternatives consequently were less precise than they would be in statutes, panel members still were able to grasp their meaning and express opinions about what general impacts each might have. Thus, delphi study of funding plans and their impacts could only provide policy makers with general information needed to choose sources of funds for achieving desired land management objectives; exactly how funds from a particular source should be woven into the overall funding program of county governments would require additional study.

Delphi panel members were first given three basic funding plans, designed to explain current funding sources and to spark ideas for new funding options. Fourteen additional funding plans were subsequently suggested by the panel. What follows is a brief presentation of the plans and the panel's judgments about the impacts which may result from them. A detailed description of the impacts has been published elsewhere (Baughman 1982b).

## Use Revenue From Sale of Land and Products

*Proceeds from sale or rental of county land and its products:*

—County may annually appropriate up to 100 percent for land management activities such as timber, wildlife, and recreation development and administration of land sales, leases, and land classification.

—Remainder, if any, is distributed to county general fund (40%) and towns and schools (60%).

*County general fund (composed of many revenue sources) allots no monies for management of county land.*

*Proceeds from state (37.5¢ per acre of tax-forfeited land) are paid to county annually for timber, wildlife, and recreation development.*

According to the panel majority, if these funding sources exist over the next 20 years, county land departments would have considerable flexibility to allocate funds among forestry-related activities. Strong lobbyists, however, would influence the allocation of money to various county land management projects. County land management would be oriented toward production of market-valued outputs. Counties would continue to spend land management revenue and state-provided revenue on timber management. Despite a timber market orientation, counties would not receive substantial revenue. They would face unpredictable fluctuations in annual income which might make it difficult to carry out long-range plans. Given these income fluctuations, counties periodically would be required to divert funds from long-term forest management programs to short-run programs with immediate needs. The result would be a flow of benefits to present generations and costs to future generations. For example, counties would be forced to overcut timber or sell land in order to generate revenue to cover their fixed land management costs. Over a 20-year planning horizon, however, the quality of timber and the variety of timber species on county land would not decrease. The timber industry would continue to benefit from county timber management and sustained harvesting.

Multiple uses of county land, though not necessarily well integrated, would not be ignored. Recreationists, especially local residents, would benefit from low-cost-per-capita facilities subsidized by land and timber sale revenue and by state in-lieu tax payments. Hunters would benefit from free access to county forest land managed partly for wildlife. The quality of wildlife habitat would not decrease. The resort industry would benefit from free access to county land for its customers.

The sale of county land would result in a mixture of impacts. The county property tax base would increase when land is sold, but, as one panel member pointed out, that does not necessarily mean that a county's financial position would improve because the demand for county services—police and fire protection and road maintenance—also may increase. Counties would benefit in the short run from land sale revenue, but in the long run, they would lose land management receipts and in-lieu tax payments from the state. Projects previ-

ously supported by land management revenue would have to be subsidized out of the county general fund or eliminated. County land sales would benefit purchasers such as farmers, timber companies, and developers; however, the timber from such land probably would not be available for harvest by the timber industry. Public recreational use would also be limited on land which is sold.

Some of the land management revenue generated by counties is currently allocated to the county, to towns, and to schools. The panel felt that county land department staff size was limited by the amount of income that county boards were willing to reinvest in land management. They also felt that school districts benefited by receiving land income for which they incurred no liability. But the panel did not feel that the county general fund, towns, or schools were disadvantaged when counties invested in land management rather than these other activities.

Counties would presumably use their own employees to manage land since the panel did not feel that consultants would have many opportunities to work with counties on land management.

## Separate Timber From Nontimber Revenue

*Proceeds from sale of timber cut on county land:*

—Revenue placed in timber development account and appropriated annually by county for timber production.

—Unappropriated funds left in timber development account over 2 years may be transferred to county general fund.

*Proceeds from sale or rental of county land and nontimber products from it:*

—Revenue distributed to county general fund (40%) and towns and schools (60%).

*County general fund (composed of many revenue sources):*

—Money for nontimber-related land management programs allocated annually by county for wildlife and recreation development and administration of land sales, leases, land classification, etc.

*Proceeds from state:*

—37.5¢ per acre of tax-forfeited land paid to county annually for timber, wildlife, and recreation development.

The panel agreed that separating timber revenue from other land management revenue would increase average annual net revenue from timber sales on county land. Average annual employment in the Minnesota timber industry would also increase. The size of individual forest products processing firms in Minnesota would increase, but the entry of new forest products processing firms into the state would not change. None of these impacts was predicted to be very large: on a relative scale of +5 to -5, where positive integers represent increases in a variable and negative integers represent decreases, the median score for net revenue, employment, and firm size was +1.

The panel did not believe that county land departments would lose to county boards the authority or

flexibility for allocating revenue among land management projects. The level of funding available for county land management as a whole would not be any more variable than under current funding programs. The level of funding for nontimber outputs, however, could be somewhat more variable as county boards change memberships. Counties would generally spend less money to produce nontimber outputs, but about the same investments would be made in timber production, the county general fund, towns, and schools.

Although counties would invest about the same amount of money in timber development as they now do, the quality of timber management would increase. Counties would develop better access to timber stands and would offer more stumpage for sale. Counties would not, however, overcut their timber and deplete their growing stock. Stumpage prices would likely increase. Counties might increase timber production; however, this increase would not induce processing firms to harvest timber from county land while holding their own timber in reserve, and the price increase would not lead to lower investments in timber management on forest industry land.

Under the plan, the panel expected counties to sell land at rates similar to current rates. Land sale revenue, however, would no longer subsidize timber management.

The quantity and quality of nontimber outputs from county land would be more variable over time as county boards change membership and alter funding levels for these outputs. On a relative basis, counties would not spend more money on wildlife habitat or recreation facilities and generally would spend less on nontimber outputs. This may occur because it would be more difficult for land commissioners to get an allocation from the county general fund than from a fund dedicated to land management. Despite lower funding for nontimber outputs, there might be an improvement in the quantity and quality of habitat for deer, grouse, and moose due to increases in timber harvesting. The panel did not believe there would be a decrease in any of the following outputs: quantity or quality of habitat for nongame animals, water quality, quantity or quality of unique vegetation, or the scenic quality of county land.

### **Issue Revenue Bonds**

#### *Proceeds from revenue bonds:*

- Revenue bonds sold to pay for large, nonrecurring timber development projects (e.g., roads, reforestation backlog).
- Bonds backed by revenue production capacity of county forest.

#### *Proceeds from sale of timber cut on county land:*

- First, timber revenue bonds paid.
- Second, remainder placed in timber development account and appropriated annually by the county for timber production.
- Unappropriated funds left in timber development account over 2 years may be transferred to county general fund.

#### *Proceeds from sale or rental of county land and nontimber products from it:*

- Revenue distributed to county general fund (40%) and towns and schools (60%).

#### *County general fund (composed of many revenue sources):*

- Money for nontimber-related land management programs allocated annually for wildlife and recreation development and administration of land sales, leases, land classification, etc.

#### *Proceeds from state:*

- 37.5¢ per acre of tax-forfeited land paid to county annually for timber, wildlife, and recreation development.

The panel agreed that revenue bonds designed to fund large timber development projects such as reforestation and road construction would result in an increase in average annual net revenue from timber sales on county land, an increase in average annual employment in the Minnesota timber industry, and an increase in the average size and number of individual forest products processing firms in Minnesota. The increases in employment, number, and size of processing firms would be relatively small, however. Most of the increase in timber supply would be consumed by expansion or diversification of existing processing firms.

The panel felt that counties would improve the quality of land management planning. Once policies for land management were developed, they would be more stable. Counties would increase their orientation toward producing market-valued outputs. Bonding would commit counties to a long-term production program and counties would invest more money in timber development. Counties, however, would pay closer attention to the economic feasibility of forestry investments because bond payments may very well interfere with proper timber management. Debt service on bonds might be higher than the return on forestry investments if the bonding proposal is not carefully planned.

The panel expected some of the revenue bond funding to be used for development of better road access to timber stands. This, along with improvements in timber utilization, would increase the quantity and quality of timber harvested. Both timber supply harvested from county land and stumpage prices would be less erratic; stumpage prices, however, would increase over time. As a result of a more stable timber supply, the timber industry would feel more secure in developing long-range plans for investments in processing facilities. In the harvesting sector, however, part-time loggers would tend to be displaced by full-time professional loggers. Several panel members commented that this change would occur regardless of the funding plan. The panel did not think that firms owning timber land would invest less money in developing timber resources on their own land as a result of this county funding plan.

Counties would continue to sell about the same amount of land under this plan as under current plans.

The county general fund would not be increased as a result of the program. Counties would spend relatively

less money to produce nontimber outputs. Despite less money being allocated to nontimber outputs, the panel agreed that the quantity and quality of nontimber outputs would not change. In fact, wildlife associated with timber harvesting and reforestation would probably increase. Improved road access to county land would also encourage more recreational use.

#### **Issue Revenue Bonds Temporarily**

*Use revenue bonds for roads and timber development on county land, but only to extent needed to bring county timber production up to a high level.*

The panel felt that a time limit on the use of revenue bonds would encourage counties to develop a more analytical approach to management. Use of bonds would assure investors that county governments were committed to timber development projects and to the timber sales needed to repay the revenue bonds. There would also be more public interest in how land management funds were spent.

This plan would have numerous impacts on the timber industry. It would produce more timber for forest industries, although counties would periodically "overcut" timber to pay bond debts. Bond sales would give the timber industry some assurance that counties were serious about timber management and subsequently would encourage development of a more permanent wood-based industry. Despite the use of revenue bonds, it would take decades to get county land up to a high level of timber production.

The plan would reduce direct commitments to nontimber outputs, but some indirect impacts which result from timber management might be beneficial to wildlife and subsequently to hunters. New roads built with bond money would also attract more recreationists and private homes where county and private lands are intermingled.

#### **Issue Revenue Bonds for Permanent Roads**

*Use revenue bonds to develop permanent system of roads for county land, but not for other timber development projects.*

The panel reported that improved road access would facilitate timber management, timber harvesting, and recreational use of county land. The timber supply available to the timber industry would increase, consequently, more county timber potentially would be available to small timber buyers. Even though counties could not use bond revenue for timber development practices, the panel did not believe reforestation would be impeded. The panel offered a statement of caution that counties may have to "overcut" timber to pay debt service on bonds.

#### **Develop Contingency Fund for Revenue Bond Proceeds**

*Place proceeds from revenue bonds in contingency fund and allocate for timber management to reduce lumpiness in annual timber sale income.*

The panel agreed that lumpiness in timber sale income was a problem and that this plan would give county land departments greater financial stability in

carrying out long-range forest plans. This stability in management would manifest itself in a more stable, long-term timber supply for the timber industry. Nontimber outputs would not be adversely affected. The panel warned that the cost of bonds could reduce total net revenue from county land and that it might be too easy to use this money for regular operating expenses and nontimber outputs.

#### **Invest Land Sale Proceeds**

*Invest land sale proceeds in interest-earning bonds, bank accounts, etc., and allocate interest earned to land management.*

The panel believed this plan would permit counties to sell land better suited to another ownership without depleting capital assets of counties. It would increase funds available for county land management for a period of time and then stabilize the funding level. The long time period needed to generate revenue could hurt reforestation and access road development in the short run. This plan would not alter the rate at which land is being sold nor would it influence the amount of money spent on nontimber outputs. It also would not increase the supply of timber available to the timber industry.

#### **Fund Projects Throughout Their Lives**

*Prepare long-range, comprehensive plans for county land and dedicate county and state funds to specific projects throughout their lives. Annual changes in funding levels allowed to reflect changes in the economy.*

In the view of the panel, this plan probably would not increase the quantity or quality of timber harvested on county land, but it might improve the quantity and quality of nontimber outputs. Counties also would have a more stable flow of land management revenue. Since long-range projections are fraught with uncertainty, funds might become dedicated to obsolete projects. The plans would not have flexibility to handle abrupt changes in forest conditions (e.g., major fires, insect attacks, and diseases).

#### **Assess Recreation User Fees**

*Charge user fees which fully reflect the cost of providing improved recreational facilities and wildlife habitat on county land.*

According to the panel, collecting user fees on county land is generally not practical or cost effective. Some panel members expressed the opinion that user fees would be appropriate for concentrated-use areas such as campgrounds and beaches. Fees would also reduce demand for some nontimber uses. A slight majority of the panel felt user fees would free additional funds for timber management.

#### **Increase Stumpage Prices**

*Raise stumpage prices on county land to earn a reasonable profit for county and pay all land management costs from land management receipts.*

According to the panel, this plan would motivate counties to make long-term investments in timber management and make timber management programs

cost effective. It would not economically depress the timber industry, but forest industries would buy more timber from private, nonindustrial forest owners and less from counties. It would be difficult to finance major forest road construction. A small majority felt it might reduce total net revenue from timber sales. There would probably be no adverse effect on nontimber outputs.

#### **Set Aside Emergency Contingency Fund**

*Place part of excess county land management revenue in contingency fund, set at specified level, to handle emergencies and special projects.*

The panel felt that most counties would not have any excess revenue to put into a contingency account and that special projects and emergencies would always arise to consume any fund that might accumulate. It would not encourage more careful planning by counties, nor would it stabilize the funding or the workload of county land managers. The plan would not contribute to a more stable county timber supply; however, it could be a good source of money for nontimber outputs.

#### **Allocate Fixed Minimum Revenue Plus Supplementary Funds**

*Set aside annually a fixed minimum amount of revenue from county land management for resource development. Supplementary resource development funds to be appropriated from county general fund.*

If this plan were implemented, the panel felt, the level of county forest management would stabilize. Land management, however, would generally be funded at the fixed minimum, with few supplementary funds appropriated.

#### **Supplement Land Revenue With General Fund**

*Basically fund all county land management from revenue generated from sale of products and services from land, but also allocate money from county general fund to balance production of market- and nonmarket-valued outputs.*

Funding for nontimber outputs would be very dependent on the wishes of the county board, according to the panel. Funding would fluctuate with the economy. County land departments would continue to concentrate management on market-valued outputs to ensure that there would be some financial support for all programs.

#### **Place Land Revenue in General Fund**

*Place county land revenue into county general fund and allocate land management funds on basis of projected long-range need for outputs and demonstrated past performance.*

A slight majority of panel members thought the plan would not be equitable for all interest groups; in fact, nontimber outputs might receive lower funding priority. On the whole, this plan would lead to a lower and less stable level of land management funding. The timber supply from county land would also be less stable.

#### **Increase In-Lieu Payments Periodically**

*Increase state payments to counties periodically to reflect current cost of producing outputs from county land which benefit the statewide public.*

The panel concluded that, under this plan, state payments would reflect property tax inflation. The plan would help counties increase their nontimber outputs, but it would be an administrative nightmare to measure benefits and costs to a statewide public which result from programs aimed at watershed protection, recreation, and wildlife, and then to balance cost-share payments between rural and urban counties since urban counties also produce statewide benefits.

#### **Use Temporarily-Allocated State Revenue**

*State allocates money to counties for timber production only until forest land reaches full production; thereafter, timber management funded entirely from timber sale revenue. State payments continued for wildlife, recreation, and other non-timber-oriented programs.*

In the panel's opinion, this plan would move counties toward more cost-effective timber management and would assure the timber industry that the state's number one forest resource goal was timber production. On the other hand, the state would require more control over county forest management plans. The state would not insist on counties balancing nontimber outputs with timber production. Nontimber outputs would be neglected until forest land reaches full timber production, and it would be difficult to determine when full production is reached.

#### **Use State Grants for Specific Projects**

*State makes grants to counties for specific timber development projects rather than providing annual flat rate payments of 37.5¢ per acre.*

According to the panel, this plan would not ensure a more efficient use of funds, since the state would be approving individual projects rather than comprehensive management plans. It would, however, encourage counties to plan more extensively than under programs of guaranteed income. Grants would be more costly to administer than flat rate payments and would likely go to the best "promoters" rather than to the most worthwhile projects. Counties would lose flexibility in using funds for various kinds of forest resource projects. The state would gain more control over resource goals, and timber management would become more important than nontimber outputs. Finally, there would be greater fluctuations in county land department funding.

#### **Policy Implications**

Although the objectives toward which counties strive with management of their land are not written in concise form in any readily available "policy handbook," it is reasonable to assume that certain goals are

generally applicable in the case of forest resource management. In evaluating the preceding alternative funding plans, this study assumed that counties wished to:

- Increase net income from timber sales.
- Increase employment in the timber industry.
- Increase timber supply on county land.
- Increase nontimber outputs such as recreation and wildlife.
- Increase entry of new forest products processing firms.
- Maintain flexibility in allocating funds among projects.

The funding plans which seem to be appropriate for achieving each objective are discussed below. Objectives are discussed as though they are mutually exclusive. Where counties have multiple objectives, policy makers should consider all the tradeoffs between funding plans.

**Net Income.** If counties wish to increase net income from timber sales, they could separate timber sale income from other land income and fund timber management activities with timber sale revenue. They might also generate greater net revenue by selling bonds to raise capital for forest road construction and timber management. Bonds increase the element of financial risk, however. Poor planning for the use of bond revenue or changes in the timber economy could reduce net revenue. The carrying costs of the bonds might exceed the projected profit margin from timber management. Counties would probably spend less money to produce nontimber outputs under these plans, but the quantity and quality of nontimber outputs would not change much. In fact, wildlife associated with timber harvests might actually increase. County timber management also would become more cost effective if the state allocated money to counties for timber management only until forest land reached full production; thereafter, timber management would be funded entirely from timber sale revenue.

None of these plans would cause a very large increase in net revenue from timber sales. Counties might have a greater impact on net revenue by providing equipment and training for foresters who could then make use of the latest forest management information, including more careful financial analyses of investment alternatives.

**Employment/Timber Supply.** Counties could increase timber supplies and modestly increase employment in the timber industry by separating timber revenue from other land management revenue, and then funding timber management from timber revenue. The use of revenue bonds would also give counties additional capital to develop access to timber. Better access would yield an immediate increase in the available timber supply and facilitate more intensive forestry. Bonding would lead to higher employment in forest management, as well as in the forest products industry.

**Nontimber Outputs.** Nontimber outputs include a wide variety of products and services such as recreation, wildlife, aesthetics, and watershed protection. If counties prepared long-range, comprehensive plans, and

both county and state funds were dedicated to specific projects, then the quantity and quality of nontimber outputs would generally improve. These outputs also would increase if state payments to counties increased periodically to reflect current costs of producing them.

Recreational use of county land might increase if more forest access roads were built with funds generated by the sale of revenue bonds. In order to pay back revenue bonds, however, counties would spend more money on timber management, and they might spend less on developing recreational facilities, especially those facilities for which user fees could not be collected.

Policies which intensify timber management would benefit wildlife such as grouse and deer that depend on a mixture of timber size classes created by a patchwork design of timber harvesting. By separating timber sale revenue from other land management revenue and then funding timber management from its own revenue, counties might intensify timber management and benefit certain wildlife. Sale of revenue bonds for timber management might also intensify harvesting and benefit wildlife associated with harvesting and regeneration of forests.

**Entry of New Firms.** The only panel suggestion which might lead to an increase in the entry of new forest products processing firms was sale of revenue bonds to generate money for timber management and forest road construction. This funding plan would commit counties to an intensive, long-term forest management program. Forest industries would be justified in relying on continued timber supplies from county land. Increases in the timber supply would result from investments by counties in forestry. A greater wood supply would contribute to entry of new firms which could rely on this ensured supply over a period of time.

**Flexibility.** If counties wish to maintain flexibility in allocating funds among projects, then current policies should be continued. Other policies analyzed would have a tendency to reduce the discretionary power of county boards and county land commissioners.

## Timber Supply Agreements

County governments earned nearly \$1.6 million from timber sales in 1979 (Kobs, 1979). Timber sale procedures affect both the amount and the timing of revenue earned by counties. Since counties own 21 percent of the net growing stock of timber in northeastern Minnesota (compiled from Jakes and Raile, 1980, and Spencer and Ostrom, 1979), county timber sale procedures can influence the structure of the timber harvesting industry, including the success of small-scale, independent loggers. Sale procedures may also affect the size and diversity of wood processing firms, as well as the rate of expansion or entry of new forest products processing firms into Minnesota. Thus, potential changes in county timber sale policies should be carefully considered before enactment since they may have far-reaching consequences.

## Existing Timber Supply Agreements

**State Statutes.** State law sets forth broad guidelines for the sale of timber by county governments (Minn. Stat. §282.04 [1]). The county auditor is responsible for selling timber. In practice, however, the county land commissioner is usually responsible for appraising timber, marking boundaries, preparing harvest guidelines, and inspecting the site for compliance with harvest specifications (McCann and Ellefson, 1980). Timber appraised at less than \$3,000 may be sold at not less than the appraised value at a private (negotiated) sale, commonly called a section one sale. Timber valued at more than \$3,000 must be offered at a public auction sale and notice must be published in an official paper within the county. If final settlement is based on a scale of cut products, the volume, location, and appraised value of the timber must be included in the advertisement and any bids offered above the appraised price are to be in the form of a percentage added uniformly to the appraised price of each species of timber advertised. Timber offered at a public sale for which no acceptable bids are received may later be offered at a private sale at not less than the appraised price.

The purchaser must pay in full for the timber at the time of the sale except at auction sales, where the down payment must be 20 percent of the sale value and the remaining 80 percent must be paid prior to entry. If auction sales are partitioned into predetermined cutting blocks, then the down payment is 20 percent of the sale price of the entire sale. The value of each separate block must be paid in full before any cutting may begin in the block. If timber is sold on a scaled-volume basis, timber other than hardwood pulpwood and sales under \$200 must be scaled after harvest either by the county or by a consumer (e.g., a sawmill). If the scaled volume is larger than the presale estimated volume, then the purchaser must pay an additional amount proportional to the increase in volume at the same rate as his bid. If the final scale is less than the estimated scale, then the purchaser is reimbursed for his overpayment.

The county may lease timber stumpage for up to 10 years. Any lease involving a payment of more than \$300 per year must be offered at a public sale. If the county sells land on which a stumpage lease exists, the lessee is reimbursed for rent paid beyond the cancellation date of the lease.

The commissioner of natural resources must approve the tract on which timber is to be sold, the appraisal, the forestry practices to be followed in the cutting of timber, and the designation of the persons who scale timber (Minn. Stat. §282.04 [1]).

**County Timber Sale Procedures.** Counties have refined broad statutory guidelines into more precise timber sale agreements. County land commissioners were interviewed to determine timber sale agreement procedures in various counties (Table 6). The largest single sale in progress covered 280 acres. In 62 percent of the counties, the largest sale was 120 acres or less. The longest timber sale agreement in existence was for 3 years. In 85 percent of the counties, the longest agreement did not exceed 2 years.

Counties are required to appraise the value of their timber before it is sold. The DNR Division of Forestry develops a base price for major tree species and products, as well as guidelines for adjusting this price to account for variations in logging costs on different sites. The base price is developed from a formula which takes into account bids made at recent auctions, as well as general economic indicators (Ford, 1980). Sixty-two percent of the counties use the state's base price to value their timber. Seventy-seven percent of the counties adjust the base for differences in logging costs. Thirty-nine percent of the counties rely on sources in addition to state guidelines in setting base prices. These sources may include prices from all public agencies in the area or prices paid by processing firms for delivered wood. The base price is set by the county board in nearly all counties, although the land commissioner has authority to adjust the base price to account for differences in logging costs.

All counties that have auctions advertise the stumpage volume by species and by product, and provide a legal description of the sale area or directions to the site. Fifty-six percent of the counties list the acreage involved. In all cases, bids are submitted in the form of a percentage to be added to the appraised value. All counties require full payment before harvesting begins, but they differ in regard to the exact time of payment. Fifty-six percent of the counties require full payment on the day of the sale. One county requires full payment within 24 hours of the time of the auction. Thirty-three percent of the counties require performance bonds.

Scaling procedures also varied among counties. Seventy-seven percent of the counties scaled virtually all wood. One county sold hardwood pulpwood on its estimated volume, but scaled all other wood. Another sold hardwood pulpwood on its estimated volume, scaled other wood appraised at over \$100, and did not scale less valuable wood. A third county sold all pulpwood on a volume estimate, but scaled sawlogs.

Specific policies protecting purchasers of county timber that was later destroyed (e.g., by fire) or expropriated were nonexistent at the county level. Very few land commissioners had ever heard of such cases and no county had statements in timber sale contracts to cover such situations. Sixty-four percent of the land commissioners conjectured that the buyer would be reimbursed if a reasonable effort had been made to harvest the timber promptly after the purchase date. One land commissioner thought his county would not reimburse the buyer.

If a contract were breached by a logger, then the county may temporarily or permanently halt timber harvesting. Very few land commissioners had encountered such a situation, but they listed the following situations which might lead to a temporary halt: high fire danger, violation of game animal law, damage to stream bank, and disruption of road traffic. This should not be construed as a complete list, nor should these cases be thought of as well-defined policies. The majority of land commissioners would halt logging immediately—one would probably give up to 10 days' warning.

Table 6. Timber sale procedures by county, 1980.

Procedure	County														Summary Statistics
	Aitkin	Becker	Beltrami	Carlton	Cass	Clear-water	Crow Wing	Hubbard	Itasca	Koochi-ching	Lake	Pine	Louis	200	
1. Largest sale in progress (acres)	160	20	15	280	100	40	60	20	120	160	160	120	200	200	Mean = 112 Median = 120
2. Longest sale in progress, excluding extensions of time (years)	2	1	2	3	2	1	1	1	2	3	2	2	2	2	Mean = 1.8 Median = 2
3. Price-setting procedure:															
- County board considers prices set by surrounding public agencies and sets price by species and product	X														8%
- County board sets prices on recommendation of land commissioner who uses state guidelines tempered by opinions of surrounding public agencies		X													8%
- Use state base prices and adjustments for logging costs			X	X	X			X		X	X	X			54%
- County board sets base price on recommendation of land commissioner who considers prices set by surrounding public agencies and prices paid by processing firms for delivered wood; base price adjusted to account for different logging costs						X	X								15%
- Use state base prices									X						8%
- Land commissioner sets base price based on prices set by surrounding public agencies and bids on recent sales; use state adjustments for logging costs													X		8%
4. Information in auction sale advertisement:		no sales						no sales			no sales	no sales			
- Acreage	X		X	X		X							X		56%
- Legal description of sale area or directions to sale	X		X	X	X	X	X		X	X			X		100%
- Stumpage volume by species	X		X	X	X	X	X		X	X			X		100%
- Stumpage volume by product	X		X	X	X	X	X		X	X			X		100%
5. Form for bids:															
- Percentage of appraised unit price added uniformly to all species	X		X	X	X	X	X		X	X			X		100%
6. Payment procedure:															
- \$100 down on day of sale, 10% performance bond + 25% down payment within 30 days of sale date; balance prior to cutting but no later than 2 years from sale date	X														11%
- 25% down on day of sale as performance bond; full payment within 30 days or before logging begins			X												11%
- Full payment on day of sale				X	X	X	X			X					56%
- \$100 down on day of sale; performance bond within 30 days of sale date; balance before cutting									X						11%
- Full payment within 24 hours of time of sale													X		11%
7. Payment adjustments:															
- Hardwood pulpwood sold on volume estimate; other wood scaled after harvest and payment adjusted to volume cut	X														8%
- Hardwood pulpwood sold on volume estimate; other wood with appraised value over \$100 scaled and payment adjusted to volume cut		X													8%
- Scale all wood except sales of only a few cords; payments adjusted for volume cut			X	X	X	X	X	X	X	X	X	X	X	X	77%

Procedure	County												Summary Statistics
	Aitkin	Becker	Beltrami	Carlton	Cass	Clearwater	Crow Wing	Hubbard	Itasca	Koochi-ching	Lake Pine	St. Louis	
- Pulpwood sold on volume estimate; sawlogs scaled and payment adjusted for volume cut												X	8%
8. Compensation to buyer for timber destroyed before harvest:													
- Refund payment proportional to volume lost unless cutting permit about to expire	X				X							X	27%
- Refund payment proportional to volume lost		X	X					X	X	X	X	X	64%
- No compensation				X									9%
9. Reasons for stopping harvest temporarily (T) or permanently (P):													
- Removing timber before scaling	TP			P	TP		P	TP	T	P			31% T, 46% P
- Cutting reserved timber	TP	TP		T	TP				T	T	T	T	62% T, 23% P
- Insufficient payment		TP									TP		15% T, 15% P
- Violating harvest utilization specifications			TP	P			P	TP			T	T	31% T, 38% P
- Damaging roads			TP						T		T	T	31% T, 8% P
- Boundary line trespass	P	P	P	T	P	T	T		T			T	38% T, 31% P
- High fire danger									T		T		15% T
- Game animal violation									T				8% T
- Damage to stream bank										T			8% T
- Disruption of road traffic											T		8% T
- Discovery of unique natural resource			P										8% P
- Assignment of cutting rights to another party				P									8% P
- Buyer goes out of business					P								8% P
- Nonpayment of overrun								P					8% P
0. Days notice before harvest stopped temporarily	0	0	0		0	10		0	0	0	1	0	Mean = 1 Median = 0
1. Days notice before harvest stopped permanently	0	0	0	5		10		0			0	0	Mean = 1.8 Median = 0
2. County sets minimum wood utilization standards	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	100%
3. Who pays for construction of permanent timber access roads:												none built	
- County	X	X	X	X	X	X		X	X	X	X		92%
- Timber buyer	X			X	X	X	X		X	X			67%
- State Division of Wildlife	X												8%
4. Who constructs permanent timber access roads:												none built	
- County	X	X	X	X	X	X		X	X	X	X		92%
- Timber buyer	X			X	X	X	X	X		X	X		67%
5. County sets logging road construction standards	no	no	no	no	no	yes	yes	yes	yes	yes	yes	no	54% yes 46% no
6. Who regulates use of logging roads:													
- County	X	X	X	X	X		X	X	X	X		X	77%
- Timber buyer											X	X	15%
- Both						X							8%
7. County leases timber	no	no	no	no	no	no	no	no	no	no	no	no	100%

Reasons given for a permanent cancellation of a contract include: discovery of a unique natural resource which might be destroyed by logging (e.g., blue heron rookery), assignment of cutting rights to another party, timber buyer goes out of business, and nonpayment of timber overrun. If a contract were to be cancelled, most land commissioners would immediately halt logging. Situations which might lead to either a temporary or permanent halt to logging, depending on the severity of the problem, include: removing timber before it is scaled, cutting reserved timber, boundary line trespass, violating harvest utilization specifications, damaging roads, and insufficient payment.

Minimum wood utilization standards are written into timber sale contracts in all counties.

Ninety-two percent of the counties pay for and construct most permanent timber access roads. In 67 percent of the counties, timber buyers sometimes pay for or construct these roads. Counties have taken over most road construction and have financed it with state in-lieu payments or BWCAW timber management intensification grants (16 U.S.C.A. §1601). Logging road construction standards are set by the land commissioner in 54 percent of the counties. In the remainder, the timber buyer apparently develops the standards. The use of logging roads is regulated by the county in 77 percent of the counties, by the timber buyer in 15 percent of the counties, and by both the county and timber buyer in 8 percent of the counties. None of the counties actually leases commercial forest land for timber harvesting or management purposes.

### Alternative Timber Supply Agreements

According to a 1977 statewide forest survey, 9.1 million cubic feet of unutilized wood are grown annually in northern Minnesota (Jakes and Raile, 1980; Spencer and Ostrom, 1979). County governments may be in an ideal position to encourage expansion of the forest industry by better utilizing their portion of this statewide surplus. According to George Banzhaf & Company (1980), lack of an ensured wood supply makes existing forest industries reluctant to expand production and limits new entrants unable to acquire investment capital. Public agencies control a majority of the state's forest resource. Forest industries in Minnesota own a relatively small amount of land compared to those in other regions of the country where forest industries are thriving (Minnesota Legislature, 1961). The wood resource might be more fully utilized if public agencies guaranteed large-volume, long-term timber supplies to forest industries. George Banzhaf & Company (1980) suggests timber supply agreements as a means to facilitate industrial expansion.

There are precedents for long-term supply agreements between public landholding agencies and the forest industry. Since 1930, such agreements have been an important means to stimulate utilization of untouched forest resources in Canadian provinces. Public ownership accounts for 92 percent of Canadian forest land (Jackson, 1977); the timber industry could not flourish as it does without long-term timber supply

commitments from provincial governments. Pearse (1976, p. 2) notes that in British Columbia

through the rights and responsibilities embodied in tenure arrangements, the Crown regulates not only the rate and pattern of timber harvesting but also such diverse matters as public resource revenues, the intensity of silviculture, the construction of roads and public works, provisions for the protection and enhancement of other forest values such as wildlife, recreation, and water supplies, certain manufacturing practices, export and marketing controls, and other matters that extend well beyond the conveyance of timber rights. Moreover, in indirect but important ways, the forest tenure system moulds the structure of the forest industry, the broad pattern of economic and social development in the province, and the quality of the natural environment.

Timber supply agreements have been used by a number of other governments, including Nigeria, Uganda, Kenya, Zambia, Ghana, New Zealand, and Australia (MacGregor, 1972).

Government agencies in the United States do not commonly enter into long-term supply agreements; however, a few cases have been documented:

- The Tennessee Valley Authority, the Atomic Energy Commission, the City of Norris, and a coal company pooled their lands into a single unit and leased them to an entrepreneur. The lessee agreed to build a sawmill, dry kiln, planing mill, and other facilities (Klein, 1971).
- In 1950 the U.S. Forest Service created a sustained yield unit in Oregon. Timber is sold at an appraised price, generally without competitive bidding, to mills within 6 miles of Lakeview, Oregon, or within 3 miles of Paisley, Oregon. The Forest Service agrees to supply a certain volume of wood to those geographic areas, not to specific mills (Wylie, 1957).
- Gogebic County, Michigan, has an agreement to supply 20,000 cords of aspen over a period of 5 years to a firm which produces aspen paneling. The firm agreed to build a processing plant only if a portion of its timber supply could be guaranteed. The firm has been in business since 1968 and employs 250 persons (Bolen, 1981).
- The State of Michigan has investigated options for long-term timber supply agreements with forest industries for timber on state forest land (Fox, 1980). One suggestion has been for a 10-year volume agreement in areas where allowable cut volumes are in substantial surplus, and where the lessee is unable to acquire a substantial timber supply via regular sales.

Although timber supply agreements can be extremely complicated, certain components appear repeatedly, namely: acres (or volume) of timber controlled by the agreement, tenure, marketing of agreements, payment procedures, harvest control (e.g., utilization and site conservation standards), risk sharing for natural disasters, timber management responsibility, road construction responsibility, nontimber land use controls, and control over noncounty land owned by the purchaser of the agreement (Brodie et al., 1964; Carroll, 1977; Crossley, 1975; Greene, 1979; Guttenberg, 1972; Jackson, 1977; MacGregor, 1972; Nautiyal, 1977; Pearse,

1976; Siegel, 1973; Siegel and Guttenberg, 1968; Wright, 1969). Each component has a broad range of alternatives. A brief description of these alternatives follows.

**Acres.** Timber supply agreements usually designate an acreage or volume of timber which will be available for harvest during the term of the agreement. County timber sale agreements in Minnesota commonly cover 20 to 40 acres; the largest area under contract in 1980 was 280 acres. What acreages or volumes could counties consider? In 1973, the average Minnesota pulp mill required about 33,000 acres of land similar in timber growth potential to county forests in order to sustain production (computed from data in Blyth et al., 1979; Jakes and Raile, 1980; Spencer and Ostrom, 1979). If a county wanted to supply 10 percent of a new mill's annual round wood requirements, an agreement specifying 3,300 acres of forest land would be needed.

**Tenure.** The longest tenure for a county timber sale in Minnesota in 1980 was three years, excluding extensions of time granted for various reasons. State law permits counties to enter into stumpage agreements for up to 10 years (Minn. Stat. §282.04 [1]). What tenure should counties consider? George Banzhaf & Company (1980) suggests agreements of 10 to 20 years so that companies can depreciate plants and equipment. A 20-year agreement would give a new firm substantial economic security. Agreements longer than 20 years may be appropriate if counties wish to relinquish all timber management responsibility to the lessee. Since 40 or more years are required to grow pulpwood and 80 to 100 years to grow sawtimber, agreements of 50 to 100 years would permit firms to harvest mature timber, regenerate the forest, and again harvest mature timber before an agreement expired. Counties could renew agreements in five-year increments if certain conditions were met (Pearse, 1976). Renewable agreements give a firm an ensured timber supply but permit counties to periodically renegotiate the terms of the agreement.

**Marketing of Agreements.** The manner in which long-term supply agreements are allocated is crucial to their success. Large public timber sales are usually made at oral auctions or by written, sealed bids. These procedures may not be appropriate where there is a lack of competition. If counties want to encourage entry of new firms, they may need to negotiate a price for the agreement. Stumpage prices could be escalated if a formula or index were built into the agreement (Hotvedt and Tedder, 1977). The stumpage price offered may in fact be incidental to awarding an agreement. For example, a 10-year agreement involving land owned by the Tennessee Valley Authority, Atomic Energy Commission, City of Norris, and a coal company was awarded to a firm which agreed to do the following (Klein, 1971):

1. Negotiate a stumpage price with each landowner.
2. Build a hardwood utilization complex in the Oak Ridge-Clinton area.
3. Build a sawmill and bandmill with a capacity of 10 million board feet of lumber per year.

4. Use modern logging equipment, including rubber-tired skidders, cable skidders, and long-length logging trucks.
5. Bring timber to mill in maximum possible lengths to reduce logging costs and increase yield at the mill.
6. Invest at least \$350,000 in facilities within 1 year.
7. Construct a dry kiln and a planing mill on the same site as the sawmill within 15 months.
8. Construct additional wood processing facilities such as a veneer plant, a hardwood dimension plant, a pallet plant, or a particleboard mill within 5 years.

It was agreed that when the lessee fulfilled the above requirements and invested at least \$1 million on the site in addition to the sawmill, then the lessee could extend the lease for an additional 10 years.

Counties, therefore, would need to define their objectives for long-term agreements and then develop a creative marketing procedure which ensures their success.

**Payment Procedures.** If counties insist on payment in advance of harvesting, such payment could be made for timber which the lessee expected to cut during the next month, the next quarter, or the next year. Advance payment could also be made before the logger began harvesting a specific cutting block. If counties became involved in long term agreements (e.g., 50 years), they could require advance payments or regular installments for all timber harvest and management rights on the land over the entire lease period.

Requiring advance payments could force counties to make volume estimates before and after cutting. They could, however, eliminate the post-harvest scaling cost if the accuracy of the pre-harvest cruise were increased and lump sum payment based strictly on that volume cruise were required (Pearse, 1976). The cost of a cruise could be eliminated if counties measured only the cut volume and permitted payments to be made after harvest when the timber volume could be measured accurately. Post-harvest payments based on the scaled volume could be made monthly, quarterly, yearly, or by the cutting block.

Rather than tying payments to the volume harvested during a particular period of time, counties could require regular installments (monthly, quarterly, or yearly) regardless of the actual volume harvested. For a long-term agreement, counties could require a minimum annual payment—perhaps equivalent to the property tax rate on similar land in private ownership—and then require periodic payments based on the timber volume harvested (Pearse, 1976).

Escalator clauses in the contracts would permit counties to change timber prices during the term of the agreement (Hotvedt and Tedder, 1977). Price changes could be based on formulas, economic indices, or negotiations.

**Harvest Control.** Standards for wood utilization and site conservation consistent with county objectives could place severe economic strain on timber purchasers; thus, counties should be willing to negotiate the standards to avoid creating excessive financial burdens.

Alternatively, counties could sell timber on an estimated volume basis with a lump sum payment. The high bidder then would remove all the timber which is worthwhile financially to remove (Pearse, 1976).

Over the period of a long-term agreement, it is unlikely that the lessee would cut exactly the same volume of timber every year. Large fluctuations in the volume harvested may create cash flow problems for county governments if timber payments are associated with the harvest volume. Large fluctuations in the harvest could also disrupt county plans to create a mixture of age classes of timber needed for the sustained yield of wood products. To mitigate these problems, counties could set maximum or minimum harvest limits. For example, counties could require the lessee annually to cut at least 50 percent of the allocated yearly volume and cut within 10 percent of the allowable cut every five years. Any number of variations of this cut level are possible (Pearse, 1976). For a very long lease counties could simply require that the land have at least as high a timber productivity at the end of the lease as at the outstart. Measures of productivity would have to be specified.

**Risk Sharing.** Over the agreement period, many types of disasters could destroy a substantial amount of timber. The agreement should state who bears that loss. At one extreme, counties may decide to provide timber to the lessee from other land resources whenever timber is destroyed. At the other extreme, the lessee may bear all the risk and pay for the timber even though destroyed. Between these extremes there are numerous schemes for sharing the risk between both parties (Siegel, 1973). Usually the party that owns the timber bears the loss; therefore, the agreement should be very explicit about when ownership of the timber changes hands. If a lessee depends heavily on county timber, then the county may want to guarantee replacement of timber which was destroyed, at least up to a certain maximum volume or time period. This would give the lessee a fairly reliable timber supply, but also provide the county flexibility to end an agreement which could not be physically fulfilled because of limited timber resources.

**Timber Management Responsibility.** Timber harvesting is only one phase of timber management; trees must be regenerated and precommercial timber stands may need improvement to perpetuate the forest. The agreement should specify who is to do this work. At times it may be more efficient for the lessee to do such work, and if so, the county must provide compensation. This may be achieved by lowering the bid on timber stumpage, by county reimbursement for management costs (Pearse, 1976), or by lengthening the tenure of the agreement to permit harvesting timber for which management costs are incurred.

**Road Construction Responsibility.** Like timber management costs, road construction costs could be paid directly by either the county or the lessee. If the lessee builds roads, the county should bear the cost by considering it in the bid for stumpage or reimbursing the lessor (Pearse, 1976).

**Nontimber Land Uses.** Timber harvesting sometimes conflicts with other land uses. For example, visits by hunters, hikers, and fishermen may be disrupted by logging activity. Timber harvesting may be hazardous or inconvenient for recreationists who lease cabin sites on county land. The timber supply agreement ought to clearly define which party controls nontimber uses of the land, and should spell out limitations on harvesting to safeguard other land uses. A county may want to control all nontimber land uses, with or without compensation. A county might, for example, permit a lessee to run a recreational facility or lease hunting rights, but compensation in addition to timber stumpage payments would be in order (Pearse, 1976).

**Control over Noncounty Land Owned by Lessee.** Generally, counties lack authority to regulate management or harvest of timber from private land. If large timber supply agreements were offered, however, a firm might choose to exploit its timberland and then rely on the county for assistance. At the other extreme, a firm might choose to reserve timber on its land and cut predominantly from county supplies. These situations could lead to temporary overharvesting or underharvesting of the sustainable timber yield in a region. One way to avoid such incidents is for the county and lessee to pool land into a sustained yield unit from which a purchaser could not cut more than the yield which could be perpetuated on the entire unit (Pearse, 1976).

## Timber Supply Agreement—Delphi Results

Timber supply agreements can involve complex legal requirements. In order to ease the burden on delphi panel members, the agreements were written to include only the main elements. The agreements would require considerable refinement before being used as legal documents. They should, however, enable county policy makers to determine a general direction in which to proceed.

Panel members were first given four timber supply agreements to stimulate thinking about current sale procedures and to provide a framework for developing alternative procedures and assessing the impact of alternative agreements. A 20-year planning period was considered by the panel. Twenty-six timber supply agreements were suggested by the panel, making a total of 30 reviewed. The four initial agreement schemes are presented here in detail; variations in each supply agreement component suggested by panel members are also described briefly. A detailed description of the impacts which may result from the alternatives has been published elsewhere (Baughman 1982b).

### Small-Volume Auctions and Negotiated Sales

*Acres: 300 or less*

*Tenure: 3 years*

*Marketing: Competitive timber bids on sales over \$750; negotiated price on smaller sales.*

*Payment: Lump sum at time of sale.*

*Harvest Control: County sets tree harvest and site conservation standards.*

*Risk: Buyer reimbursed for timber destroyed by natural disaster prior to harvest.*

*Timber Management: County performs and pays for all work.*

*Roads: Buyer pays for temporary roads; county pays for other roads.*

*Nontimber Land Uses: County controls.*

*Noncounty Land Owned by Buyer: No special county control.*

In the panel's view, this agreement would provide county land managers with considerable flexibility in management practices while also allowing them to maintain the status quo, if desired. Counties also would benefit from full payment before logging begins (a potential disadvantage to timber buyers); however, they could be adversely affected if prices increased during the contract period since they would be unable to renegotiate stumpage price.

County timber sale administrators would face a heavy burden in deciding who obtains negotiated timber supply agreements and the price that should be paid for them. Informal agreements made in connection with negotiated sales have sometimes tied county timber sale administrators to commitments they wish had never been made. Numerous small agreements would also complicate the application of sound silvicultural practices. Counties would lose money on negotiated agreements since prices are generally lower and administration costs higher than with competitive sales; this cost differential would be essentially equivalent to a timber price subsidy to processing firms. Low stumpage prices in negotiated agreements could also reduce stumpage prices on private nonindustrial lands and discourage private timber management.

The panel agreed that current sale procedures would perpetuate a noncompetitive and inefficient logging industry, which in turn would hurt consumers. However, negotiated sales would be less likely to squeeze small, independent loggers out of business and more conducive to the development of new timber industry than competitive bidding. Although employees of small logging companies would generally receive lower wages and benefits than employees of large logging companies, service firms associated with logging and trucking would benefit by having a large clientele of small, independent loggers.

Competitive timber sales on large tracts would result in better utilization of timber than occurs on small, negotiated sales.

On the other hand, medium- to large-scale logging and wood processing firms would be unable to make long-term plans under this scenario, and so would not be able to increase operating efficiency.

Wildlife and environmental quality in general would be enhanced by small, scattered site disturbances. Sites up to 300 acres could be harvested without a widespread, adverse effect on wildlife.

#### **Long-Term Timber Volume Guarantee**

*Acres: Approximately 10,000; county guarantees 235,000 cubic feet of wood fiber annually from generally designated area.*

*Tenure: 10 years; renewed in 5-year increments.*

*Marketing of Lease: Competitive timber bids among timber processing firms.*

*Payment: Quarterly payments for volume cut; unit prices adjusted periodically; lessee reimbursed for approved reforestation expenses.*

*Harvest Control: Lessee cuts at least 50% of allocated volume annually and within  $\pm 10\%$  of allowable cut every 5 years; county sets tree harvest and site conservation standards.*

*Risk: County supplies 235,000 cubic feet of wood annually regardless of natural disasters.*

*Timber Management: Lessee replants cutover areas and is reimbursed for approved expenses; county performs and pays for all other work.*

*Roads: Lessee pays for the temporary logging roads; county pays for other roads.*

*Nontimber Land Uses: County controls.*

*Noncounty Land Owned by Lessee: No special county control.*

In the panel's opinion, this agreement would lead to an *increase* in the following: average annual net revenue from timber sales on county land, average annual employment in the Minnesota timber industry, size of individual forest products processing firms in Minnesota, and entry of new forest products processing firms.

The agreement would have a variety of impacts on counties. County forest management plans would place more emphasis on timber production objectives of the lessee than on multiple use of county land. Counties would lose flexibility to adjust land use to meet new social demands and changing economic conditions, e.g., large natural disasters which reduce their ability to supply a guaranteed volume of wood. They might also be hindered in exchanging tracts of land; however, they would be better able to harvest their maximum allowable cut and would have a more stable flow of income from timber sales. At times, counties would have too little money available to reimburse the lessee for reforestation work on county land.

The process of allocating timber cutting rights to various loggers would pass from the county to the timber processing firms which would own the agreements. The county would not, however, have difficulty finding a buyer for timber outside of a lease area.

The agreement would have positive and negative effects on the timber industry. Firms remaining in the industry would experience increased profits and two tax advantages—depletion allowance and capital gains. Forest road development would increase, giving better access to timber. Long-range planning for harvesting and processing activities would be possible. The more stable timber supply would result in higher financial risk to the timber industry during extended downturns in the general economy, and a competitive advantage through better wood availability during upturns. The panel did not feel that local economies would be subject to greater fluctuations in timber product markets or that county governments would have to increase welfare and unemployment payments to displaced small loggers. Average wages for loggers may increase. Timber harvesting operations would become more mechanized. There would be fewer workmen's compensation claims being filed by loggers.

The quantity and quality of nontimber outputs from county land would generally increase, but there are exceptions. Counties would have more money to spend on nontimber outputs; however, increased expenditures would depend on local politics. Since the average size of individual timber harvesting areas (cutting blocks) would increase, there would be a potential for loss of wildlife habitat and water quality, depending on regulatory controls used by counties. The diversity of forest vegetation may also decrease.

#### **Cooperative Sustained Yield Unit**

*Acres: 10,000 county-owned plus 10,000-lessee owned.*

*Tenure: 20 years; one 20-year renewal guaranteed.*

*Marketing of Lease: Competitive timber bids from processing firms owning 10,000 acres of timber land in Minnesota.*

*Payment: Quarterly payments for volume cut; unit prices adjusted periodically; lessee reimbursed for approved timber management expenses on county land.*

*Harvest Control: County sets allowable cut level on 20,000-acre unit; lessee cuts within  $\pm 10\%$  of allowable cut every 5 years; county sets tree harvest and site conservation standards for entire unit.*

*Risk: County and lessee share timber losses due to natural disaster by reducing allowable cut.*

*Timber Management: Lessee prepares management plan and performs all work for unit; lessee is reimbursed for approved projects on county land.*

*Roads: Lessee builds all roads and is reimbursed for county-approved, permanent roads.*

*Nontimber Land Uses: County controls use on its 10,000 acres in the unit.*

*Noncounty Land Owned by Buyer: Harvest volume on 10,000 acres owned by lessee is controlled by county.*

The panel concluded that under this agreement there would be increases in average annual net revenue from timber sales on county land, average annual employment in the Minnesota timber industry, and size of individual forest products processing firms in Minnesota. The entry of new forest products processing firms into Minnesota would, however, decrease. The requirement that a firm own 10,000 acres of forest land in Minnesota in order to enter into a lease may be a strong deterrent to new firms.

In the panel's judgment, the sustained yield unit would give counties a more stable flow of income from timber sales; however, county net revenue from timber sales would decrease if a processing firm gained a monopoly over county timber sales. Counties would have more stable land management policies but would lose flexibility to adjust land use to meet new social demands and changing economic conditions. Counties would benefit from greater economies of scale in management practices. For example, they would need fewer personnel to supervise timber sales, yet would be better able to plan and harvest their allowable cut of timber. If a lessee went out of business, however, the county

would be left with an incomplete timber management program and a lack of personnel to complete it.

The timber industry would be affected in several ways. The value of private forest land would increase as processing firms compete to buy land for their half of the sustained yield unit. The timber industry would gain greater use of the depletion allowance and capital gains when preparing income tax returns. The size of timber procurement areas for individual forest products processing firms would be reduced. The average size of individual timber cutting blocks would increase, and timber harvesting operations would become more mechanized. The process of allocating timber cutting rights to various loggers would pass from the county to the timber processing industry.

Counties would be oriented more toward timber production and less toward multiple use of county land. The quality and quantity of nontimber outputs from county land would be reduced unless counties required a good management plan and improved their regulatory activities. The diversity of composition of forest vegetation on county land would decrease with the increased size of timber harvesting areas.

#### **Sale of All Timber Management Rights**

*Acres: 50,000*

*Tenure: 50 years; one renewal if lessee matches highest bid.*

*Marketing of Lease: Competitive timber bids among timber processing firms.*

*Payment: 10% down, balance in 10 equal payments with interest; annual "property tax" fee paid.*

*Harvest Control: Timber productivity at end of lease must at least equal present productivity.*

*Risk: Lessee absorbs all timber losses.*

*Timber Management: Lessee performs and pays for all work.*

*Roads: Lessee builds all roads.*

*Nontimber Land Uses: County controls.*

*Noncounty Land Owned by Lessee: No special county control.*

The panel agreed that average annual net revenue from timber sales on county land would decrease as a result of this agreement since, as one panel member stated, "competitive bids may be quite conservative considering such a long time span." A small majority of the panel felt that average annual employment in the Minnesota timber industry would increase. The panel predicted that the size of individual forest products processing firms in Minnesota would increase while the rate of entry of new firms would decrease, perhaps because existing firms have more incentive to protect their historical timber supply and more financial leverage to win the bids than would new firms.

Counties would lose flexibility to adjust land use to meet new social demands and changing economic conditions, but they would be better able to project their future income. Counties would face a decrease in management costs but an increase in regulatory costs. They would need fewer forest management personnel but

could not enforce the productivity level maintenance requirement without a harsh and clearly defined penalty. Local economic impacts of timber production would be more stable.

The forest industry would have lower wood supply costs and a better competitive edge in regional and national markets. The number of timber harvesting and processing firms would decline. Those firms which remained would have more financial stability. Firms which got leases would invest in new processing facilities, and the industry would expand its output. The process of allocating timber cutting rights to various loggers would pass from the county to the timber processing industry. The average size of timber harvesting areas would increase, and timber harvesting would become more mechanized.

Nontimber outputs would be strongly affected, since major conflicts would develop between nontimber land uses (controlled by the county) and timber development (carried out by the lessee). Counties would increase their ability to plan for nontimber outputs. This is essential since the quantity and quality of nontimber outputs from county land would be reduced unless counties require a management plan which includes these outputs and unless counties improve their regulatory activities. The panel did not believe that the quality of recreational activities on county land would be reduced. In fact, populations of wildlife associated with more intensive timber harvesting (e.g., deer) would increase.

Review of the timber supply agreements just discussed led to additional agreements suggested by panel members. The following sections, organized according to the major provisions of the agreement, identify these alternatives and set forth the panel's judgment as to the likely impacts of each alternative.

**Acreage options.** Panel members suggested timber sale agreements covering 500, 5,000, and 10,000 acres. In their judgment, timber sales covering 500 acres would have the same impact as those encompassing 300 acres.

Agreements for 5,000 acres of timber would, however, have significant additional impacts. Counties would be better able to make long-range management plans, a more stable flow of income would be generated, and timber sale administration costs would be reduced. The acreage is small enough that counties would be able to distribute agreements among several firms and maintain competition in the industry. The timber industry would be able to set up a more efficient harvest schedule. Impacts on nontimber outputs could be positive or negative, depending on specific terms of an agreement.

Agreements covering 10,000 acres would facilitate entry of more new processing firms. Stumpage prices may not rise, however, since competition for the agreement would be limited.

**Tenure options.** The panel suggested terms ranging from 3 to 20 years. A 3-year agreement would give a county maximum flexibility to adapt management to both changing resource conditions and public demand, yet would be short enough to eliminate difficulties in scheduling regeneration activities. Industry would be

prevented from locking up more land than can actually be harvested, but would be better able to weather changes in the business cycle than under a shorter term agreement.

A 10-year agreement would give counties more stable land management goals and a more stable source of revenue while reducing timber sale administration costs. The timber industry would have a more stable timber supply, and loggers could better plan timber harvesting schedules. A 10-year period would not be sufficiently long to prevent industry from reacting to changing product demands.

A 20-year agreement would give more stability to county land management plans, and industry would have a more stable timber supply. Twenty years is sufficient time for industries to amortize their investments in processing equipment.

**Marketing options.** Timber could be sold by negotiation, by sealed bids, or by oral auction, in the panel's judgment. Negotiated agreements would permit counties to manage timber in stands which do not attract competitive bids and would provide employment and income for buyers that cannot afford large sales. Sealed bids would often increase stumpage prices above levels in negotiated sales, and would create more bidding uncertainty than at oral auctions since competitors would be unknown to each other. Winning firms likely would pay far more than necessary to outbid competitors. Unsuccessful bidders would lose the right to harvest in their traditional cutting areas. Oral auctions would favor large buyers. Auctions would avoid most of the excessive overbidding common in sealed bids, although "grudge wars" might still cause overbidding.

**Payment options.** Panel members suggested a wide variety of payment procedures. For example, buyers could pay 25 percent at the time of the sale, with the remainder paid quarterly in proportion to the timber volume cut. Under this procedure, counties would have a stable flow of timber sale revenue, and buyers would not face a large annual payment. Buyers could also make quarterly payments for the volume cut, with a fixed minimum payment in addition to land rent due each year. Compared to the advance payment option, this procedure would give counties a more stable and predictable flow of timber sale revenue.

**Price indexing options.** Counties could resort to price indexing for long-term agreements. According to the panel, counties would receive a fair market price for timber if indexing occurred annually, beginning after the second year, and might lose money if indexing were postponed until after the third year. Annual indexing would protect the timber industry from radical price hikes.

**Harvest control options.** Most timber sale agreements specify wood utilization standards and procedures to conserve the productivity of the land. In the panel's judgment, if the county retains full authority to set tree harvest and site conservation standards, then it can better protect its investment in long-term timber and nontimber resources. The county would, however, incur regulatory costs and would need to have additional

professional expertise in designing timber sales. If the county and lessee jointly set tree harvest and site conservation standards, the county could learn about and discuss the lessee's harvest plans and could benefit from input from the lessee's technical experts. This method would give the lessee more freedom to adapt harvest standards to the product demands of the market.

**Risk sharing options.** In the panel's opinion, the county and lessee could share risks by reducing the allowable cut to compensate for losses which occur. By this procedure, the county would avoid depletion of resources in order to cover a timber supply obligation. Industry, of course, would have a less secure timber supply than if the county fully guaranteed the supply. If the county and lessee shared losses based on tax structure allowances available to the lessee for destroyed timber, then the county would probably lose substantial income after a major disaster. If the lessee absorbed all losses, then the lessee would have a strong incentive to quickly harvest timber to avoid potential losses. The timber buyers' financial risks would be increased, but the county's losses would be reduced.

**Timber management options.** Several possible arrangements were suggested for sharing timber management responsibility. If the county performs and pays for all work it would have better control over the quality of timber management work; it is possible, however, that the lessee could accomplish the work more efficiently. The county also would have better control over habitat manipulations for nontimber outputs and there would be less chance for industry to influence county plans.

The lessee could replant harvested areas and be reimbursed for reasonable expenses while the county performed all other work. This procedure would encourage a better job of logging to accommodate tree planting. Loggers would be more diversified in their work and less dependent on logging for their livelihood. Compensating the lessee directly for tree planting would free the county of future informal obligations. If the lessee performs all work and is reimbursed by the county for all reasonable expenses, then the county would reduce its administrative burden. The lessee, however, would have more responsibility for integrating timber harvesting with the overall land management plan of the county.

**Road construction options.** Road construction is a major component of many timber sales. The panel overwhelmingly felt that the lessee should build and pay for temporary logging roads, and the county should build and pay for permanent roads. In general, the county was considered to be more effective in designing and building roads than the lessee. Controversy over closing of county roads would be minimized. Giving the lessee some responsibility for roads could result in faster road construction since the logger would be anxious to harvest and market the timber.

**Options for control of nontimber land uses.** There was a very strong agreement among panel members that the county should control nontimber land uses, but specify such uses in timber sale contracts. The timber buyer

would know his responsibilities and possible conflicts in advance of harvesting, and conflicts between timber and nontimber users would be minimized.

**Options for control of noncounty land owned by lessee.** The panel strongly agreed that no special county control should be exercised over noncounty land owned by a lessee. Under such a procedure, lessees would give little consideration to nontimber outputs on their forest lands, but counties would avoid costly regulations.

## Policy Implications

Timber supply agreements are an important tool for managing county forests. By varying the terms of an agreement, managers can have significant impacts on county government, on the timber industry, and on nontimber outputs. The desirability of different types of agreements depends on the objectives of county policy makers; objectives assumed for analyzing the implications of various timber supply agreements are similar to those listed earlier for the analysis of program funding options.

**Net Income.** Long-term timber sale agreements appear likely to increase net income from timber sales. To maximize revenue, counties could prepare agreements that encompass about 10,000 acres of land and run for 10 to 20 years. Timber sale agreements should be allocated through competitive bidding and should be distributed among several firms to maintain competition in the area.

**Employment.** Average annual employment in the Minnesota timber industry could be increased significantly by agreements which focus on tracts of about 10,000 acres and a duration of 10 to 20 years.

**Timber Supply.** Panel members did not evaluate the potential for increasing the timber supply on county land. However, it is reasonable to expect that agreements which increase net income from timber sales might lead to increased investments in timber management and subsequently higher timber yields. If employment increases in the timber industry, then that too might indicate that more wood is available for processing. If new roads are built as a result of leasing, more timber could become accessible for harvest. These accomplishments are consistent with those predicted for a lease arrangement covering an area of 10,000 acres and a tenure of 10 to 20 years.

**Nontimber Outputs.** Long-term timber agreements might either increase or decrease nontimber outputs, depending on the specific output. Timber agreements commit counties to manage land primarily for timber production. Animals such as deer which respond favorably to timber management practices will thrive, but wildlife species which depend on old-growth forests might decrease in numbers. Counties should plan to do all non-harvesting timber management with their own personnel to retain maximum control over forest management for nontimber purposes. Specific regulations should be written into the agreements if counties wish to protect recreation areas, soil, unique vegetation, or wildlife habitat. Counties should build all permanent roads to avoid attempted closure by loggers. Counties

should exercise their authority to write harvest guidelines and should regularly inspect harvest operations. The size of the area covered by a lease has less influence on nontimber outputs than regulations that specify the size and configuration of cutting blocks, the types of trees to be cut, and the method of harvest. A 10- to 20-year lease would give good protection to nontimber resources, providing that counties have identified nontimber production goals and retain adequate authority to manage nontimber outputs. If counties are uncertain about what outputs to produce, then leases of three years or less would be more appropriate.

**Entry of New Firms.** Counties could best encourage movement of new forest industries to Minnesota through agreements lasting 10 years and covering approximately 10,000 acres. Industries should not be required to own land in Minnesota as a prerequisite for securing an agreement. Existing firms might have an advantage over new entrants if agreements are allocated through competitive means. Counties could avoid favoring established firms by offering several agreements at one time, by putting limits on either the number of agreements or the area of county land that one firm may control, or by negotiating agreements with special terms, of which timber prices might be only one consideration.

**Flexibility.** Counties could best maintain flexibility in allocating land to different uses by continuing relatively short-term, small-area timber agreements. For each year or each acre added to an agreement, counties would lose flexibility to change resource allocations. Agreements should clearly explain which rights are being sold and which are being retained by the county and should explain the circumstances under which an agreement could be terminated and the procedures to be followed for termination. Agreements should clearly explain how risks are to be shared for timber destroyed prior to harvest.

## Forest Land Ownership

### Existing Land Ownership Policies

**State Statutes.** Land ownership policies vary somewhat from one county to another, but all counties operate within the same statutory guidelines when deciding whether to retain or dispose of land. According to Minnesota law (Minn. Statutes, §282.01 [1]),

It is the general policy of this state to encourage the best use of tax-forfeited lands, recognizing that some lands in public ownership should be retained and managed for public benefits while other lands should be returned to private ownership.

As a step toward deciding whether or not a parcel of land serves a public benefit, the county board must classify each parcel of land as either conservation or nonconservation land. The board must consider the following factors: present use of adjacent land; soil productivity; character of forest or other vegetation; accessibility to established roads, schools, and other public services; suitability of land for particular uses;

and suitability of the forest resource for multiple-use, sustained-yield management. The resulting classification should help counties to encourage land uses which facilitate economical and adequate transportation, roads, water supply, drainage, sanitation, education, and recreation; to reduce government expenditures; to conserve and develop natural resources; and to develop agriculture and other industries.

As a general rule, counties are to retain conservation land and dispose of nonconservation land. Conservation land is to be retained and managed for forestry, water conservation, flood control, parks, game refuges, controlled game management areas, public shooting grounds, or other public recreational or conservation uses. Land suited primarily for forestry or conservation may be sold, but zoning restrictions are to be put on the land to ensure continued use for those purposes (Minn. Statutes, §282.01 [2]). Nonconservation land is to be disposed of if the county board considers it advisable. The board must keep in mind accessibility of the land, its proximity to existing public improvements, and the effect of the sale and occupancy of the land on the public burdens (Minn. Statutes, §282.01 [3]).

Some tax-forfeited land is to be reserved in public ownership regardless of its land use classification or the laws by which it became tax-forfeited. Counties must not sell mineral rights to any land (Minn. Statutes, §§282.12, 282.225). Counties must not sell surface rights to land which is in a designated state mining unit or which is under a mining permit or lease (Minn. Statutes, §282.01 [8]). When tax-forfeited land borders on a meandered lake or river, the county must retain a strip of land at least two rods in width (measured from the ordinary highwater mark) for public travel. Any parcel of land which has less than 50 feet of waterfront may be sold if it is in the public interest to do so and sale is approved by the commissioner of natural resources (Minn. Statutes, §282.018).

There are checks and balances which further reduce the flexibility of county boards to decide whether to retain or dispose of land. The state commissioner of natural resources must approve the selection of land to be sold and the sale value of timber on land which is to be sold (Minn. Statutes, §282.01 [3]).

The DNR has developed a land classification system that many counties use to make judgments about disposal or retention. It defines nine land use categories: not classified, agricultural (cultivation), agricultural (pasture and open), mining, recreation or aesthetic, conservation, game and fish, commercial peat or gravel, and access to lake or other land (Carlson, 1978).

If any tax-forfeited land is located within the boundaries of an organized town with taxable valuation over \$20,000 or in an incorporated municipality, the town board or governing body has a right to approve the land classification and the selection of land to be sold (Minn. Statutes, §282.01 [1]).

Any tax-forfeited land may be sold by the county board to any organized or incorporated governmental subdivision of the state for any public purpose for which the subdivision is authorized to acquire property (Minn. Statutes, §282.01 [1]).

**County Policies.** Counties have flexibility in deciding what types of land to retain, and policies differ somewhat from one county to another. Fourteen county land commissioners were interviewed to learn about current trends in land ownership policies. Since land commissioners collect data used to make land ownership decisions, they were assumed to be best able to judge the trends in county land ownership policy.

Land commissioners were asked to judge the relative importance of each of 12 factors in influencing county decisions to retain or dispose of land (Table 7). Factors judged to be "very important" were residential, commercial or industrial use potential; mining potential; recreation potential; road access; present use of adjacent land; and the type of adjacent ownership.

Land commissioners were also asked to explain *how* each of these factors influenced county decisions to retain or dispose of land (see Appendix).

With the exception of Cook County, counties plan to retain most of the land they now administer. If counties dispose of large tracts, they will do it by means of exchange rather than sale. Every county has some land it would dispose of under certain circumstances.

As a rule, counties retain land in designated memorial forests, land which borders lakes and streams, land with mineral deposits, and land with high timber production potential. They may sell land with low potential for timber production, especially if it is suitable for agriculture or urban development, but they retain land which is good for recreation or wildlife.

Counties usually sell land suited for agriculture. They want to increase the size of existing farms, but

counties will retain small tracts if there is little agricultural development in the area. A few counties will sell forest land for conversion to agriculture if the land sold will expand existing farms.

Land with good recreation potential is usually retained. Selected sites may be sold for commercial development in special cases.

Counties usually sell platted residential lots and sites suitable for commercial or industrial development. They are more likely to sell land for these uses if the land is near an urban area where there are good roads and existing public services (e.g., police, fire department, schools). Counties generally avoid selling land for residential use if it would create a scatter of dwellings which would increase public service costs.

Land with good fish or wildlife habitat is usually retained almost regardless of size or location of the parcel.

Parcel size is not an important factor if the parcel is over 40 acres. Parcels less than 40 acres in size are more likely to be sold, especially if they are distant from blocks of public land and suitable for farms, businesses, and residential areas. Even very small parcels are retained, however, if particularly suitable for recreation, wildlife, or access to other public land.

Present use of adjacent land sometimes influences county land ownership decisions. Counties are often willing to dispose of land in order to expand the size of adjoining farms, housing developments, and businesses. Counties would retain park land near a housing development, however. They are usually not interested in selling land to increase the size of adjoining private forest ownership.

The type of adjacent ownership may influence county decisions. Counties usually retain land which creates blocks of public ownership, regardless of the type of public owner. Counties are generally not interested in disposing of land to other adjoining public agencies unless land is exchanged. Counties are willing to dispose of small, isolated parcels which will help forest industries consolidate ownership, especially if the county has no other land nearby.

On the whole, counties retain parcels which do not have road access, but they are willing to sell these to adjoining landowners who can develop their own access.

Counties hold down the cost of providing school, police, and fire department services by retaining tracts which are distant from these resources. This is only a concern when land might be used as a residence. Zoning was frequently mentioned as a more effective tool than land ownership to keep down the cost of county services.

Distance to a large block of county land seems to be less important than the uses to which land is put. On the whole, counties are more likely to sell small parcels of land (less than 40 acres) if they are many miles from a large block of county land. They would retain parcels regardless of distance if needed as access to other public land or if desired for public recreation or wildlife habitat.

**Table 7. Relative importance of factors which influence county land ownership decisions.**

	Very Important or Moderately Important	Slightly Important or Not Important
	(% of land commissioners)	
Timber productivity potential	79	21
Agriculture potential	64	36
Mining potential	71	29
Intensive recreation potential	86	14
Residential, commercial, and industrial site potential	93	7
Fish and wildlife habitat quality	93	7
Parcel size	64	36
Present use of adjacent land	71	29
Adjacent ownership (e.g., state government, forest industry)	79	21
Distance to a public road	86	14
Distance to school, police, and fire service	64	36
Distance to a large block of county land	57	43

## Alternative Land Ownership Policies

Counties have adopted a policy of retaining large areas of forest land in order to produce timber, wildlife, and recreation and to ensure protection of watersheds. Most of their management efforts are focused on timber production since timber sales generate money for county governments and provide a resource for the timber industry—a major component of the northern Minnesota economy. Policymakers continually question whether or not county governments or some other public or private entity should own and manage these lands if timber is to be a primary output. The range of possible owner-managers includes county governments, the state government (principally the DNR Division of Forestry), the federal government (principally the U.S. Forest Service), forest industries, and private nonindustrial forest landowners.

If counties turn over administration of their land to the state, they are freed from the burden of land management but also lose control over the uses to which it is put. If counties manage land, they receive 75¢ per acre per year from the state as payments in lieu of taxes; however, if the state manages this land, then counties receive only 37.5¢ per acre per year (Minn. Statutes, §§477A.11-.14). Counties also lose the revenue which could have been earned on the land. County government income likely has a higher multiplier effect on the local economy than state income which also would be lost (Muench, 1966). Counties may be justified in transferring land to the state if the land's geographic location is such that the state could more effectively manage it or, if a county owns a relatively small acreage and the state, by virtue of its large land holdings and diversified staff, would have economies of scale which permit it to manage the land more efficiently than the county.

Counties could transfer some of their land to the U.S. Forest Service. Land would have to be either exchanged or sold at a fair market value, but the Forest Service might have difficulty obtaining funds to buy much land. There would still be vast areas of county land outside of national forest boundaries. If counties were able to sell some land to the Forest Service, counties would be giving up control over management and use of the land. Counties would still receive 25 percent of the revenue from this land plus 0.75 percent of the appraised value of acquired land within the BWCAW (16 U.S.C.A. §1601). It is likely that much of the income earned by the Forest Service would be lost from the local economy; that same income earned by a county government might have a greater local multiplier effect (Muench, 1966). Counties might be justified in disposing of land to the Forest Service to consolidate holdings, but some land commissioners feel that intermingled county and federal land gives the county more leverage to influence Forest Service land management policies.

Forest industries are apparently interested in increasing their holdings of land or at least controlling cutting rights on more land. They were the only ownership class in northern Minnesota which showed an increase in commercial forest land between 1962 and 1977 (Jakes and Vasilevsky, 1980). Clephane (1978) states that "ownership of timber resources will continue to be a

critical component in the industrial success of most companies in the integrated forest products and pulp and paper industries." He further points out that the 20 largest forest products firms own, on the average, enough land to provide 43 percent of their wood supplies. His analysis shows that, in the forest products sector, the only companies that have grown at faster-than-average rates over time are those with a dominant, low-cost timber base. The most important reason for owning timber land is to provide an ensured supply of raw materials for highly capital intensive production facilities. It is more economical for firms, especially for pulp and paper mills, to operate continuously at full production than to shut down and start up periodically (Clawson, 1977).

There are several considerations which might influence the decision as to whether counties should retain land or transfer it to the private sector. These considerations are discussed below.

**Intensity of Land Use.** Harkin (1972) suggests there is a federal land ownership trend involving disposal of land for more intensive uses—agriculture, residential, industrial, commercial, private recreational, and utility. Land intended for more extensive uses—forestry, grazing, watershed, public recreation, and mining—is often retained in public ownership. A suggested reason for this trend is that it is more efficient to delegate the myriad decisions concerned with intensive land use to the private sector, whereas decisions pertinent to extensive land use are fewer and can be handled by the often cumbersome administrative processes of the public sector. Harkin cites the high productivity of the American economy, which is dominated by private property and market mechanisms, as evidence of the efficiency of delegating many decisions to the private sector.

**Public Goods.** Certain goods and services are often impossible, or prohibitively costly, to confine to a selected clientele. Producers may find that consumption by one person need not diminish the quantity consumed by anyone else. Outputs of this nature are termed "public goods" (Browning and Browning, 1979). An aesthetic forest, a well-regulated watershed, or land available for extensive recreation are examples of public goods. If the public demands these outputs, then counties might be justified in owning land to ensure their availability.

**Externalities.** Another form of market failure is the externality, i.e., a harmful or beneficial side effect that is borne by people not directly involved in the market exchange. The impact is not determined through mutual agreement among all those affected (Browning and Browning, 1979). For example, large-scale conversion of hardwood forests to softwood timber types may lead to significant changes in wildlife populations and may adversely affect hunting opportunities. Consideration of wildlife impacts is outside the market exchange. This impact on wildlife and on hunters is an externality. Counties might be justified in retaining land in order to ensure adequate consideration for externalities in forest management.

**Economies of Scale.** Given the long rotations required for forest management, landowners must own very

large tracts of timber to maintain production efficiency. A forest should be large enough to permit an annual cut at least as large as the annual cut of an optimum-sized logging operation. Forest planning, planting, and office work are also more efficient with very large forest areas (Gray, 1969). If counties retain land for multiple use to ensure the availability of certain public goods or to account for externalities, they should be sure to retain enough land to operate efficiently. Few private individuals would have the wealth to acquire enough forest land to operate at an efficient scale. Some forest industries, however, may be interested in acquiring land to make management of their own holdings more efficient.

**Planning Horizon.** Timber management requires a long planning horizon; rotations, for example, are commonly 40 years or longer. Forest land in private ownership may change hands frequently. In a 1977 study of tax-forfeited land sold by Itasca County, Minnesota, for example, 31 percent of the parcels sold by the county to private individuals during the previous 17 years had already changed hands at least once (Ellefson, Palm, and Lothner, 1980). Such ownership changes and accompanying changes in management objectives might not be conducive to optimum timber production. Counties might be justified in owning land for timber production because more stable timber management objectives are assumed to be a character of county governments. Timber industries, however, have shown recently that they, too, are willing to make long-term investments in timber management.

**Guiding Rate of Interest.** Differences in acceptable discount rates might make it economically feasible for counties to invest in certain management practices which the private sector would not undertake. It has been suggested that the social rate of discount in the public sector need not be as high as the rate for an equivalent evaluation in the private sector (Baumol, 1968; U.S. Congress, 1967). Counties might consider non-market valued outputs in their analysis in order to justify projects which are not feasible in a strictly financial sense.

**Monopolies.** In some localities, disposal of county land could lead to private monopolies over timber supplies. By retaining land, counties can pursue policies which maintain competition in the stumpage market (Gray, 1969).

**Altruism.** Governments frequently are altruistic toward future generations (Slinn, 1969). By retaining land, counties are able to preserve and ration nonrenewable resources over several generations. Unique flora and fauna, historical sites, or unusual recreation sites can be preserved by government. Private individuals might not value these resources as highly and might destroy them for some short-term gain.

**Equity Objectives.** Counties might want to provide equal opportunity for forest resource use for a variety of interest groups (Slinn, 1969). Under a system of private land ownership, goods and services are available to those who can afford to buy land or pay for its outputs. Under public ownership, the cost of producing outputs

could be spread among a wide population. Some income redistribution could occur by subsidizing the cost of certain outputs such as recreation.

**Availability of Information.** Counties might be justified in retaining land because of a lack of available information about its potential uses (George Banzhaf & Company, 1980). It might be unwise to allocate poorly characterized land to the private sector, since it would be difficult to repurchase the land for public management if subsequent information indicated that it was a mistake to dispose of it.

**Public Choice.** Counties might also want to retain land in order to have a wide latitude for choice in the use of resources (Harkin, 1972). Counties could alter their land management over time to reflect public demand for resources ranging from wilderness to timber.

## Land Ownership Policy Options—Delphi Results

Delphi panel members initially were presented with three possible land ownership options. In addition, each panel member suggested more policies and expressed opinions about the impacts each option would generate if it were in effect over the next 20 years. All policy options were considered equally important during the analysis. A more detailed description of the impacts expected from each policy option has been published elsewhere (Baughman 1982b).

### Retain Most Land

*Retain 2,000,000 acres:*

*—1,880,000 acres for timber production (at least 30,000 acres per county).*

*—320,000 acres for mining, peat, recreation, fish, wildlife, and access to water and public land.*

*Dispose of 600,000 acres:*

*—550,000 acres to fill in state and federal forests, with scattered parcels less than 80 acres sold to private individuals and firms.*

*—50,000 acres to urban and agricultural uses.*

This land ownership policy would have several impacts on county governments. According to the panel, counties would benefit by disposing of parcels which are inefficient to manage. On the other hand, disposal of county land implies loss of control over its future use, and possible loss of future revenue expected from appreciated land values. Retention of land by counties would minimize development sprawl and associated costs of government services. Retained land might also bear the fruit of unexpected resources such as minerals, peat, and gravel. The panel did not believe that the existence of large areas of public land in a county increases property taxes on private land. It also did not believe that retention of small, scattered wild tracts would benefit counties as a result of in-lieu tax payments from the state, since in-lieu payments on county land would be lower than property tax revenue realized from the same land in private ownership.

Other public agencies and private entities would be affected in numerous ways by the land ownership policy. State and federal agencies would be able to consolidate ownerships and thus manage more efficiently. The value of existing resort and lakeshore

properties would be enhanced since large tracts of similar, publicly-owned land would not glut the market. The timber harvesting industry would benefit from access to timber currently in county ownership. Timber firms, large farming enterprises, and large development organizations would be hindered since large tracts of land would not be available to them.

The policy would benefit recreation interests by maintaining access to land currently in county ownership and minimizing conflicts with private landowners; disposal of scattered tracts, however, would result in a loss of wildlife habitat available for public use.

#### **Retain Hardwood Sites, Dispose of Softwood Sites**

*Retain 1,900,000 acres:*

—1,580,000 acres for hardwood timber production (at least 30,000 acres per county)

—320,000 acres for mining, peat, recreation, fish, wildlife, and access to water and public land.

*Dispose of 900,000 acres:*

—850,000 acres for softwood timber production to forest industry

—50,000 acres to urban and agricultural uses

The panel concurred that this policy option would decrease average annual net revenue from the sale of county timber, increase average annual employment in the Minnesota timber industry, and increase the size of individual forest products processing firms in Minnesota. The panel was split over whether the entry of new firms would increase or decrease. Counties would be selling their most valuable land and would realize a one-time windfall of revenue from land sales. Decreases in timber sale revenue would not be offset by returns on investment on land sale proceeds. Counties would experience a decreased workload, yet there would not necessarily be a corresponding significant reduction in land management costs or increase in the quality of management on the smaller land base. Because hardwood and softwood lands are often intermixed, disposal of softwood land would cause a break-up of blocks of land and subsequent inefficiencies in management for both counties and the timber industry. Counties also would have more difficulty selling hardwood timber if they lacked the more desirable softwood timber to offer in a package timber sale.

By selling timber land, counties would lose some ability to stimulate or stabilize the local economy via regulation of the timber supply. Counties also would lose control of the use of land previously owned unless deed restrictions were imposed. For example, industries holding prime forest land that became more valuable for nonforestry development would be inclined to encourage the latter. Undoubtedly, some softwood land would later be sold for scattered development. Even on land remaining in public ownership, land use conflicts would be exacerbated.

The timber industry would have greater control over timber prices under this option, but the value of softwood timber stumpage held by other owners (e.g., state, national forests, or nonindustrial private) would not decrease. There would be fewer independent loggers.

The policy would have few impacts on nontimber outputs. The panel did not believe there would be any effects on wildlife, nor a significant reduction in general recreation, including hunting. Water quality, however, would decrease on land disposed of unless counties enforced water quality standards.

#### **Retain Productive Timber Land, Dispose of Unproductive Land**

*Retain 720,000 acres:*

—400,000 acres of best net revenue-producing timber land (30,000 acres per county)

—320,000 acres for mining, peat, recreation, fish, wildlife, and access to water and public land.

*Dispose of 2,030,000 acres:*

—2,030,000 acres to forest industry

—50,000 acres to urban and agricultural use

The panel agreed that average annual net revenue from timber sales on county land would decrease, average annual employment in the Minnesota timber industry would increase, and the size of individual forest products processing firms in Minnesota would increase. The panel did not agree on changes in the entry rate of new forest products processing firms into Minnesota; it appears, therefore, that the policy option would have little effect on the entry of new firms.

According to the panel, county governments would be affected in many ways. Counties would have to undertake a major effort in land classification in order to decide which tracts to sell. Fixed costs of managing the retained acreage per county might exceed revenues from product sales. Counties would have higher per-acre costs for administration of land but lower total land management costs. On balance, counties would have better and more economical forest management. On the other hand, by selling land in a period of high inflation, counties would forego an even greater income which could be earned at a later date. Furthermore, counties would be selling a long-term source of revenue for a short-term cash gain which would soon be spent and could not be replaced. Counties also would lose in-lieu tax payments from the state.

Counties probably would have fewer but more polarized land use conflicts on remaining tracts. They also would lose control over use of land disposed of unless regulatory measures were instituted. Timber interests would not buy land of low productivity; consequently, they would likely be outbid if it were sold at a public auction. In addition, industry would resell some land for real estate development, resulting in increased fire risk and trespass problems and rising county government service costs.

The timber industry would have greater control over stumpage prices. Capital that might have been used to pay stumpage prices would be diverted into land purchases. This apparently would not absorb all capital, since the panel felt that investments in timber processing facilities also would increase. Existing firms would acquire more land than new entrants and local economies would be tied to timber market conditions determined by a few large processors. One panel member commented that this situation already occurs.

On the whole, there would be a decrease in the quantity and quality of nontimber outputs, both on land retained and land sold. The principal effect on nontimber outputs would be a decrease in the quality and quantity of extensive recreation on land which is sold.

#### **Retain or Dispose of County Land Within Federal or State Parks and Forests**

*Dispose of most county land within boundaries of state or federal forests and parks to those adjoining agencies.*

*Retain most county land within boundaries of state or federal forests and parks.*

In the panel's judgment, disposal of most land within boundaries of state and federal forests and parks to the corresponding agencies would improve the efficiency of land management at both levels. It should be noted that 89 percent of the respondents felt that such a tradeoff would improve land management efficiency for state and federal agencies, but only 58 percent thought it would improve management efficiency for counties. This policy would result in more uniform land use and allow the timber industry, including loggers, to deal with a single agency in an area.

In contrast, counties could retain most of their land within the boundaries of state or federal forests and parks. Mixed public ownership would be more likely to serve a variety of different interest groups. Intermingled ownership also would give timber buyers more flexibility in acquiring timber because of differing policies of the various land managing agencies.

#### **Base Land Ownership on Timber Production Potential**

*Retain most commercial forest land with higher than average timber production potential.*

*Retain most commercial forest land with average or lower timber production potential.*

*Dispose of most commercial forest land with average or lower timber production potential.*

According to the panel, if counties retain most commercial forest land with higher than average timber production potential, the land would be likely to remain in active timber production. This policy would help ensure stability in the timber industry and the local economy. It would provide a continuing source of timber for small, independent timber buyers. Counties could project their future income potential better than if the land were sold. However, disposing of land on the basis of timber production potential would lead to fragmentation of holdings and increases in per-acre administrative costs.

One panel member suggested that counties retain most commercial forest land with average or lower timber production potential. If this were done, it is possible that net revenue from county land management would be lower; however, the relative value of land and timber might increase over time and counties could eventually reap an economic gain. Counties would avoid the administrative burden of future tax-forfeiture which might occur if land were sold. There also would be administrative advantages to using this land to consolidate county ownership around more productive land. This land would give small-scale loggers an opportunity to buy timber which might not

interest a larger company. The public also would have use of this land for nontimber uses.

From the panel's perspective, the main impact from disposing of most commercial forest land with average or lower timber production potential would be to reduce the per-acre land management costs of county government.

#### **Retain or Dispose of Noncommercial Forest Land**

*Retain most noncommercial forest land.*

*Dispose of most noncommercial forest land, except retain land with unique wildlife or recreational qualities and parcels which help to block in county ownership around commercial forest land.*

By retaining most noncommercial forest land, counties would benefit economically from rising land and timber prices. Retention by the county also would prevent private development of land which would require additional government services.

One panel member recommended that counties dispose of most noncommercial forest land, except for unique wildlife or recreation land and parcels which help consolidate county ownership around commercial forest land. Retention of particularly valuable wildlife and recreation land would prevent counties from maximizing their economic return; however, disposal of noncommercial forest would improve economic efficiency in management of remaining land. This policy would provide land for the public to use for nontimber outputs and permit the county to protect unique wildlife and recreation values.

#### **Retention/Disposal of Different Size Tracts of Multiple-Use Land**

*Retain most multiple-use land in parcels less than 320 acres.*

*Dispose of most multiple-use land in parcels less than 320 acres.*

*Retain most multiple-use conservation land in scattered parcels of less than 20 acres.*

*Dispose of most multiple-use conservation land in scattered parcels of less than 20 acres.*

Counties could retain most multiple-use tracts smaller than 320 acres. Although counties would earn some revenue from timber sales, they would have rather low economic returns on the remaining parcels. There would be greater recreation and wildlife use and greater fuelwood harvesting on the remaining land under county ownership than under private ownership.

In contrast, counties could dispose of most multiple-use lands in parcels less than 320 acres. This would increase the county property tax base, but ensuing private land development would also increase government service costs. By disposing of these tracts, counties would reduce conflicts with adjoining landowners over land use and management policy. On the other hand, counties probably would not be able to afford to repurchase land in the future if it were needed for public use.

If counties retained most multiple-use conservation parcels of less than 20 acres, such land would remain available for the public to use for nontimber outputs. Counties would also preserve the option of marketing

the land in the future if a more valuable use arises. Disposal of most multiple-use conservation land that is in scattered parcels of less than 20 acres would reduce county per-acre management costs. Land which is sold may be put to uses undesirable to the public at large, and the quality of wildlife habitat on disposed land generally would be reduced. Counties probably would not be able to repurchase land in the future if desired for public use.

#### **Retain Recreation, Fish, and Wildlife Land**

*Retain most prime recreation and aesthetic land.*

*Retain most prime fish and wildlife land.*

The panel recognized that counties receive relatively low monetary returns from recreational use of land, yet such use is an economic asset to the region. The advantages of retaining land for such use would be to promote good public relations for the county, to maintain public access for recreation, and to preserve the option of marketing land in the future if a more valuable land use were to arise. Counties probably would not be able to afford future repurchase of the land if it were sold. Counties would preserve this habitat better than would private landowners, in the panel's judgment.

#### **Retention/Disposal of Mineral and Peat Land**

*Retain most mineral land with commercial potential.*

*Dispose of most mineral land with commercial potential.*

*Retain most gravel deposits with commercial potential.*

*Retain most peat land with commercial potential for mining peat.*

*Dispose of most peat land with commercial potential for mining peat.*

The panel believed there was generally greater value in mineral royalties than in land sale revenue. Retention of mineral land would allow the county and state governments to regulate the rate at which minerals would be depleted. Disposal of most mineral land with commercial potential would not encourage economic development of the minerals, in the panel's judgment. Counties would lose some control over environmental quality on land which is sold. If a county sold surface rights but retained mineral rights, conflicts would arise between the county and the surface owner when mining began.

Some panel members recommended that counties retain most commercial gravel deposits. The panel as a whole believed that this policy would prevent a private firm from acquiring a monopoly over gravel supplies in an area. There would exist a potential for earning revenue by selling gravel, and counties could regulate the rate at which gravel would be extracted. As long as the county retained the land, the public would have continued access for other uses. In addition, the county would be more likely to protect the environmental quality of the area.

The panel felt that county revenue from peat development would exceed land sale revenue. Also, the county would be in a position to protect water quality and the

forest ecosystem. The panel could offer no consensus about the impacts that would occur if counties disposed of most land with commercial potential for mining peat.

#### **Retention/Disposal of Forest Land Suited For Agricultural and Urban Uses**

*Dispose of most agricultural land cleared for farming or hay.*

*Retain most land suited for agriculture but covered by forest.*

*Dispose of most land suited for agriculture but covered by forest.*

*Dispose of most urban land.*

Counties could dispose of most agricultural land already cleared for farming or for hay. If the land were sold at a public auction, a farmer might not be the successful bidder. Farmers, in the panel's judgment, use land to enlarge existing farms and improve management efficiency. Counties would enlarge their tax base and get an immediate income from land sales which could be allocated to many uses. Disposal of agricultural land would provide opportunities to eliminate sources of conflict between a county and adjoining landowners.

Counties could retain forested land suitable for agriculture. If counties followed this policy, the forest resource base would be stabilized and counties would avoid the cost of repurchasing land in the future if needed for a public purpose. Or, counties could dispose of such land so that farmers could expand farm size and increase production efficiency. Private agricultural use also would provide a higher economic return to the county than continued county forest management. Clearing land for agriculture, however, would cause a reduction in wildlife habitat in the panel's judgment. Comments by individual panel members suggest that a mix of agricultural land and woodland might result in improved habitat for some wildlife species.

Disposal of most urban land would result in immediate revenue for county governments. In addition, urban land use generally would provide higher economic returns to the counties than forest management. Counties would be able not only to reduce their administrative costs, but also to eliminate sources of conflict between the county and adjoining landowners.

#### **Retention/Disposal of Access to Water and Public Land**

*Retain most access to lakes or rivers.*

*Retain most land providing access to other blocks of county land.*

*Retain most land which provides access to state and federal land.*

*Dispose of most land which provides access to state and federal land to adjoining state and federal agencies.*

By retaining access to lakes or rivers, counties incur land management costs with little monetary return; however, they also minimize private shoreland development and maximize public access to recreation.

Such a policy would prevent some conflicts between private shoreland owners and environmental/recreation interests which would arise if land were sold. By retaining most land providing access to other blocks of county land and to state and federal land, counties would have access needed for management purposes and the public would have access for recreation.

Disposal of land which provides state and federal agencies access to their land would force such agencies to pay the full cost of access to their land and would promote cooperation between agencies in developing the land's potential.

## Policy Implications

Decisions by counties to retain or dispose of land under their jurisdiction can have far-ranging consequences. State law provides limited guidance for such decisions; few, if any, counties have a carefully developed policy concerning land disposal and retention. As in previous sections, alternative policies are discussed in light of six assumed objectives.

**Net Income.** If counties wish to increase total annual net revenue from county-produced timber, counties should retain land which has higher-than-average timber growing potential. Each county would need more than 30,000 acres of commercial forest land. Land should be retained in units of at least 80 acres and preferably over 320 acres. Counties should retain blocks of land regardless of the mix of hardwoods and softwoods. Land with lower than average timber growth potential should be retained if it helps consolidate county ownership around more productive land. Counties should dispose of noncommercial forest land, as well as land suited mainly for recreation, aesthetics, and wildlife. If land is retained for such purposes, management should be funded from sources other than timber sale revenue. Counties should also dispose of small tracts (e.g., less than 320 acres) of land which are inside the boundaries of state or federal forests and parks.

**Employment.** Resource base stabilization resulting from a transfer of land to the timber industry might permit increased employment in that industry. Almost any major land disposal would increase employment, although the greatest impact would be obtained by disposing of highly productive land, especially land suited for softwood timber production. The parcels should be reasonably large (e.g., 320 acres). It would be more important to dispose of a block of land than to dispose of land on the basis of species composition or site quality, factors which may be quite variable over a parcel. Counties should retain some land which is intermingled with state and federal land since the diversity of timber sale policies among agencies gives timber buyers more flexibility to acquire wood in an area. Counties should also retain land suitable for agriculture but currently covered by forest in order to stabilize the forest resource base.

**Timber Supply.** In order to increase available timber supplies counties would need to retain nearly all currently-owned commercial forest land. Counties should dispose of noncommercial forest land and any other

land which is not suited for timber production but which requires expenditures of timber sale revenue for its management. For example, counties could dispose of forest land where timber harvesting is curtailed in order to provide for recreation, aesthetics, and wildlife habitat. Counties should concentrate forestry investments on relatively large, productive sites. Even small tracts or sites of low productivity should be subject to harvest for firewood or pulpwood, but investments of time and money should be minimized.

**Nontimber Outputs.** If counties wish to increase nontimber outputs, they should retain nearly all their land. Disposal to any other landowner, except a public agency, might curtail public recreational use of the land and reduce some wildlife populations. Where counties own agricultural land or forest land suitable for agriculture, counties should lease some of the land for agriculture to create a mix of forest and farm land suited to the wildlife species desired. Counties should dispose of land to other agencies where other agencies can more efficiently manage for recreation and wildlife. Counties should retain even small tracts (e.g., 20 acres) if such tracts are the only public land in the area. Urban land should be retained or disposed of to a local government if needed for recreation. Land with deposits of minerals, gravel, or peat should be retained and leased in a manner which protects the ecosystem. River and lake access should be retained.

**Entry of New Firms.** None of the land ownership policies investigated by the delphi panel would be expected to increase the entry of new forest products processing firms into Minnesota. Disposal of either softwood timber-producing land or large areas of average or lower timber site quality might increase the size of existing firms but would not induce new industries to move into Minnesota. The panel did not suggest that counties dispose of large forest areas which have high timber production potential. It would seem that such a policy might induce new firms to locate in Minnesota, although none of the panel members apparently thought that such a policy was acceptable. Counties might want to investigate leasing policy rather than land ownership policy if they wish to induce new firms to utilize excess timber.

**Flexibility.** Counties that wish to maintain flexibility in allocating land among different uses should retain all current land holdings. Whenever counties sell land, they lose power to influence land use. Deed restrictions and zoning are powerful tools to control land use, but they are less direct than county ownership. Counties should be especially cautious about disposing of land with recreation, wildlife, mining, peat, or gravel potential, or access to waterways and public land. If land is sold at auction, counties cannot be certain who will buy it. A county might intend to sell land for agricultural use, but then have to sell it at the auction to a residential or recreational use developer. Zoning helps to control use, but it still might not stop some land uses which increase county government service costs. Counties might want to expand the use of deed restrictions or study land sale procedures to find out how to best get land into the hands of persons who would use it for a purpose desirable to the county.

## Summary and Conclusions

### Funding Plans—Summary

County land management programs are currently funded largely from the sale or rental of tax-forfeited land and from the sale of products, especially timber, derived from that land. The state subsidizes county land management by means of in-lieu tax payments and a technical assistance program for forest management. The federal government also supports county timber management under the Boundary Waters Canoe Area Wilderness Act, which provides funds for a 10-year period to intensify timber management (16 U.S.C.A. §1601). On a limited scale, counties make use of property tax levies (Minn. Statutes, §282.38 [2]), federal cost-share monies aimed at tree planting (16 U.S.C.A. §§1501-1503), state grants, private grants, and Comprehensive Employment and Training Act funds (29 U.S.C.A. §§801-992).

If counties continue to fund land management largely from sale of land and timber, as well as state in-lieu payments, they would have considerable flexibility to allocate funds among projects, delphi panel members agreed. Counties would focus land management on timber production, and they might periodically overcut timber or sell land to generate revenue needed for short-term expenses. Recreationists, especially hunters and resort customers, would benefit from access to county land and its facilities which would be subsidized by timber sale revenue. Counties would benefit from land sale revenue in the short run but, in the long run, they would lose land management receipts and in-lieu tax payments.

The delphi panel suggested a large number of alternative funding plans, including the following:

*Sell revenue bonds to pay for timber development projects.*

*Invest land sale proceeds in interest-earning bonds, bank accounts, etc., and allocate interest earned to land management.*

*Prepare long-range plans for county land and dedicate county and state funds to specific projects throughout their lives.*

*Charge user fees for recreation.*

*Raise stumpage prices on county land.*

*Set aside a contingency fund for emergencies and special projects.*

*Establish a minimum annual budget for land management, with variable appropriations above the minimum.*

*Allocate money from county general fund to balance market and nonmarket outputs.*

*Allocate all land management money from county general fund.*

*Increase state in-lieu payments to reflect current cost of producing outputs which benefit statewide public.*

*Provided state grants to counties for timber development projects.*

### Timber Supply Agreements—Summary

The largest timber sale in progress reported by county land commissioners covered about 300 acres. The longest term for a sale was three years. Timber valued at more than \$750 generally was sold at a public auction; less valuable timber was sold at an appraised price in a negotiated sale. Payment was made in full before harvesting began. Counties set tree utilization and site conservation standards; absorbed all risk from natural disasters; performed all timber management work, including most road construction; and controlled nontimber uses of the land during timber harvests. Counties did not exercise any unusual control over private land owned by a timber buyer.

If counties continue such sale procedures, according to the delphi panel, county land managers would have great flexibility to change management practices over time. Counties would benefit by getting full payment before logging begins, a practice which might adversely impact timber buyers. Numerous small timber sales would be administratively inefficient, would bring lower prices for stumpage than large sales, and might hamper counties from applying good silvicultural practices. Low stumpage prices asked by counties in negotiated sales would reduce prices on private nonindustrial land and discourage private timber management. Negotiated sales benefit small loggers and the service firms which support them. Competitive sales would result in better wood utilization but squeeze small loggers out of business. These short-term contracts would prevent processing firms from making long-range plans and from increasing their operating efficiency. They also would hurt large, mechanical logging firms. New timber industries would have an opportunity to compete for county timber. Wildlife and environmental quality would be enhanced more by small, scattered site disturbances than by large timber sales.

The delphi panel members had an opportunity to write their own long-term timber sale agreements. The various options which they suggested are outlined below for each component of a lease.

#### Acres:

- 500
- 5,000
- 10,000

#### Tenure

- 3 years
- 10 years
- 20 years

#### Marketing of lease:

- Negotiated price on small sales, salvage sales, timber not bid on at auction
- Sealed bid
- Oral auction

#### Payment procedure:

- 25% down, remainder paid quarterly in proportion to volume that is cut
- Quarterly payment for volume cut, with fixed minimum payments plus rent due each year

*Frequency of price indexing:*

—Annually

—Annually after second year

—Annually after third year

*Harvest control:*

—County sets tree harvest and site conservation standards

—County and lessee jointly set tree harvest and site conservation standards

*Risk associated with natural disaster prior to harvest:*

—County and lessee share losses by reducing allowable cut

—County and lessee share losses based on tax structure allowances available to lessee for destroyed timber

—Lessee absorbs all losses

*Timber management:*

—County performs and pays for all work

—Lessee replants cutover areas and is reimbursed for reasonable expenses; county performs and pays for all other work

—Lessee performs all work and is reimbursed by county for all reasonable expenses

*Roads:*

—Lessee builds and pays for temporary logging roads; county builds and pays for permanent roads

*Nontimber land use:*

—County controls, but specifies such uses in timber sale contract

*Noncounty land owned by lessee:*

—No special county control

## **Land Ownership Policies—Summary**

According to land commissioners, all counties except Cook intend to retain most of their land. As a rule, counties retain land in designated memorial forests, land which borders lakes and streams, and land which has mineral deposits. They retain land with high potential for timber production, wildlife, and recreation; they may sell land with low potential for timber production. Selected recreation sites may be sold for commercial development. They will sell agricultural land, especially if it will increase the size of existing farms. Land will be sold for urban use if cluster development occurs and the parcel is not desirable for a park. Counties usually sell platted residential lots and sites suitable for commercial or industrial development.

The delphi panel was asked to judge impacts which might arise from the following policy: counties retain 2.2 million acres suitable for timber production, mining, peat removal, recreation, fish habitat, wildlife habitat, and access to water or public land; and counties dispose of 600,000 acres in order to consolidate holdings of other public agencies or to dispose of small parcels which are inefficient to manage; counties also dispose of urban and agricultural land.

If this policy were in effect over the next 20 years, then, according to the panel, counties would be able to

dispose of parcels which are inefficient to manage and other public agencies would be able to consolidate ownerships and subsequently manage land more efficiently. If counties sold land, they would lose control over land use and forego an even greater income which could be earned by selling land at a future date when prices could be higher. Retention of land by counties would minimize development sprawl and associated government service costs. Land which is retained might bear unexpected mineral, peat, or gravel resources. The value of existing resort and lakeshore properties would be enhanced because the supply of such private land would be limited. The timber harvesting industry and recreationist would benefit from access to county land.

Delphi panel members had an opportunity to write their own land ownership policies for counties to consider. These policies included the following:

*Dispose of county land within boundaries of state or federal forests and parks to adjoining agencies.*

*Retain land within boundaries of state or federal forests and parks.*

*Retain commercial forest land with higher than average timber production potential.*

*Retain commercial forest land with average or lower timber production potential.*

*Dispose of commercial forest land with average or lower timber production potential.*

*Retain noncommercial forest land.*

*Dispose of noncommercial forest land, except retain unique wildlife and recreation land and parcels which block in county ownership around commercial forest land.*

*Retain multiple-use land in parcels less than 320 acres.*

*Dispose of multiple-use land in scattered parcels less than 320 acres.*

*Retain multiple-use land in scattered parcels less than 20 acres.*

*Dispose of multiple-use land in scattered parcels less than 20 acres.*

*Retain prime recreation and aesthetic land.*

*Retain prime fish and wildlife land.*

*Retain mineral land with commercial potential.*

*Dispose of mineral land with commercial potential.*

*Retain gravel deposits with commercial potential.*

*Retain land with commercial potential for mining peat.*

*Dispose of land with commercial potential for mining peat.*

*Dispose of agricultural land cleared for farming or hay.*

*Retain land suited for agriculture but covered by forest.*

*Dispose of land suited for agriculture but covered by forest.*

*Dispose of urban land.*

*Retain access to lakes and rivers.*

*Retain land providing access to other blocks of county land.*

*Retain land providing access to state and federal land.*

*Dispose of land providing access to state and federal land to adjoining agencies.*

## Conclusions

Based on the impacts of alternative policies, as determined by the delphi panel and a review of current literature, it is possible to set forth policy options which counties could pursue to achieve certain objectives. Again, it will be assumed that counties have the following land management objectives in mind:

*Increase net income from timber sales.*

*Increase employment in the timber industry.*

*Increase timber supply on county land.*

*Increase nontimber outputs such as recreation and wildlife.*

*Increase entry of new forest products processing firms.*

*Maintain flexibility in allocating funds/land.*

In the discussion which follows, these objectives will be treated as though they were mutually exclusive, since to do otherwise would require that these objectives be ranked according to their desirability, and there currently is no sound basis for such a judgment.

**Net Revenue.** Of the policy issues studied, timber supply agreements appear to offer the best opportunity to increase total net revenue from timber sales on county land. Counties should prepare agreements which offer a timber volume equivalent to the annual growth on approximately 10,000 acres. Leases should run approximately 10 years. They should be allocated by means of competitive bidding. Leases should be distributed among several firms. Timber prices should be indexed and calculated annually after the second year of the lease.

Counties might be able to increase net revenue slightly by changing their funding system. Counties should separate timber sale income from other land income and fund timber management from timber sale revenue. Other land management programs should be funded from other sources. Counties also should consider selling revenue bonds to generate capital for forest road construction and timber management. Bonds would increase the element of financial risk, however. Poor planning for the use of bond revenue or changes in the timber economy could reduce net revenue.

In terms of land ownership, counties should retain land which has higher than average timber growing potential. Each county would need over 30,000 acres of commercial forest in units of at least 80 acres (preferably over 320 acres). Counties should retain blocks of land regardless of the mix of hardwoods and softwoods. Land with low timber growth potential should be retained where it would help consolidate county ownership around more productive land. Counties could retain land which has relatively low timber

productivity rates so long as it would not require expenditures of effort and timber sale revenue which would have to be subtracted from management of highly productive land.

**Employment/Timber Supply.** Policies which increase employment in the timber industry also could be expected to increase timber supplies available from county land. The exceptions will be noted.

Changes in timber sale agreements would probably cause a greater increase in employment in the timber industry and a greater increase in county timber supplies than changes in either county funding or land ownership policies. Leases should be written to cover around 10,000 acres and last for 10 to 20 years. Leases would commit counties to timber management and give processing firms more confidence in the long-term availability of county timber supplies. These factors should be an incentive to counties to build roads, plant trees, and more intensively manage timber. Processing firms should respond by adding to plant capacities and increasing forest product outputs as demand for their products dictates. Increased activity by counties and processing firms would require more labor and subsequently yield increases in the timber supply.

By separating timber revenue and funding from other types of land management, counties would spend more money on timber management, thus increasing the timber supply and employment in the forest industry. The use of revenue bonds also would give counties additional capital to develop timber access roads. Better access would yield an immediate increase in the available timber supply and facilitate more intensive forestry.

Counties could increase employment in the timber industry by disposing of land to that industry. Industries would prefer highly productive land, especially if it were suited for softwood timber production. Parcels sold should be reasonably large (e.g., over 320 acres). Counties should retain land suited for agriculture but currently covered by forest in order to stabilize the forest resource base.

If counties disposed of land, there is a possibility it would not be bought by the timber industry, and its use could change in a manner which reduces timber production. Counties could play it safe by retaining most of their commercial forest land if they wanted to maintain or increase the timber supply. Counties should dispose of land which might require expenditures of timber sale revenue but which would produce little timber volume, unless alternate funding sources are available to provide for management. Even small tracts or sites of low productivity should be subject to harvest for firewood or pulpwood, but investments in time and money should be kept to a minimum.

**Entry of New Firms.** None of the policies suggested by the study would have a major influence on the entry of new forest products processing firms into Minnesota; funding and timber sale policies, however, might have a minor effect.

If counties were to sell revenue bonds to generate money for timber management, they would be commit-

ted to an intensive, long-term timber management program. Forest industries could count on continued timber supplies from county land. Investments in timber management would increase the timber supply. The increasing wood supply guaranteed over a long period of time might induce new firms to move to Minnesota.

Leases might also encourage new firms to move into Minnesota. Leases should have a 10-year duration and cover approximately 10,000 acres. Industries should not be required to own land in Minnesota as a prerequisite for obtaining a lease. Existing firms might have an advantage over new entrants if leases are allocated through competitive means. Counties might be able to favor new entrants by offering several leases at one time, by putting limits on either the number of leases or the area of county land that a firm may control, or by negotiating leases which require new plants or equipment.

None of the land ownership policies investigated by the delphi panel would be expected to increase the entry of new forest products processing firms. Disposal of either softwood timber-producing land or large areas which have average or lower timber site quality might increase the size of existing firms, but these policies would not induce new industries to move into Minnesota. It would appear that disposal of large areas of productive timber land would encourage entry of new firms, but no panel member suggested this policy.

**Nontimber Outputs.** If counties prepared long-range, comprehensive plans for their land and both county and state funds were dedicated to specific projects throughout their lives, the quantity and quality of nontimber outputs would generally improve. These outputs also would increase if state payments to counties increased periodically to reflect increases in production costs. Recreational use of county land might increase if more forest access roads were built with funds generated by the sale of revenue bonds. In order to pay back revenue bonds, however, counties would probably spend more money on timber management and less on recreational facilities. By separating timber sale revenue from other land management revenue and then funding timber management from its own revenue, counties might intensify timber management and subsequently benefit certain wildlife. Sale of revenue bonds for timber management would also intensify timber management and benefit wildlife associated with frequent timber harvesting and regeneration practices.

Long-term timber supply agreements may either help or hinder nontimber outputs, depending on the specific output desired and the terms of the agreement. Timber agreements commit counties to timber harvesting. Animals which respond favorably to timber management practices will thrive, but wildlife species which depend on old-growth forests may decrease in numbers. Counties should perform all timber management other than harvesting with their own personnel. This would give counties maximum control over forest management for nontimber purposes. Counties might want to write regulations into the agreements to protect the rights of recreationists, soil and water quality, and unique vege-

tation, and to enhance wildlife habitat. If counties are certain about what nontimber outputs are desirable over a long period of time, then leases of 10 to 20 years would give good protection to those resources, assuming the lease gives counties adequate authority to manage nontimber outputs. If counties are uncertain about what outputs to produce, then leases of 3 years or less would be more desirable.

If counties want to maintain or increase the levels of nontimber outputs, they should retain nearly all their land. Disposal to any other landowner (except a public agency) might reduce public recreational use of the land as well as wildlife populations. Where counties own agricultural land or forest land suited for agriculture, they should lease some of the land for farming to create a mix of forest and farm land suited to wildlife species desired. Counties should dispose of land to other agencies able to more efficiently manage for recreation and wildlife. Land with deposits of minerals, gravel, or peat should be retained and leased in a manner which protects the ecosystem. River and lake access should be retained for public recreation.

**Flexibility in Funding and Land Use.** If counties wish to maintain flexibility in allocating funds among projects, then the current funding procedure should be maintained. Other policies which were analyzed would have a tendency to reduce the discretionary use of funds by county land commissioners and county boards.

Counties can best maintain flexibility in allocating land to different uses by continuing relatively short-term, small-volume timber sales. Long-term supply agreements should clearly explain which rights are being sold and which are being retained by the county. They should explain the circumstances under which an agreement could be terminated and the procedures to be followed for termination. Agreements should clearly explain how risks are to be shared for timber destroyed prior to harvest.

Land use allocation can be most completely controlled if counties retain nearly all the land they now administer. By selling land at public auctions, counties cannot be certain who will buy land. Counties should study land sale procedures to find out how best to get land into the hands of people who will use it for a purpose desirable to the county. Counties should use zoning to control land use and perhaps expand the use of deed restrictions.

## Use of Study

Those who read this study should remember that the panel members were knowledgeable and informed persons who would be willing to explore the issues under study; however they were not omniscient. If the panel majority indicated that an impact would occur as a result of a policy, that outcome is possible but it is not inevitable. By being aware of potential impacts, policymakers can refine policies to help ensure the occurrence of outcomes which they feel would be desirable and to avoid undesirable ones. If undesirable outcomes cannot easily be avoided, then policymakers can change the policy, change their objectives, or compensate those who are to be adversely affected.

The policies developed during this study were written in general terms. It was not the intent of the study to suggest detailed policy prescriptions to counties, but to point policymakers in a general direction which might help them achieve desirable land ownership and management objectives. For example, it was not the purpose of the research to help county administrators write a particular timber supply agreement but rather to help them determine whether or not long-term supply agreements of any kind were a desirable means of allocating county timber supplies.

Because of the general nature of the approach used, the recommendations based on the impact statements should be interpreted broadly. For example, leases covering 10,000 acres were suggested as one means to increase net revenue from timber sales on county land. Leases of 500 to 50,000 acres were considered and those of around 10,000 acres were judged to have a positive impact on net revenue. The figure of 10,000 acres is not precise; leases of 5,000 acres or 15,000 acres may be equally suitable.

Some of the policies suggested by panel members were in direct opposition. For example, one panel member suggested that counties dispose of most land which is in parcels of less than 320 acres, while another panel member suggested that counties retain these parcels. One person suggested that counties retain peatlands, and someone else suggested disposing of them. These dichotomies indicate that people who are knowledgeable and informed about such policy issues do not necessarily view them the same. Each person has a different background, a different perspective, and quite likely a different objective in mind for the management of county land. Persons developing policies for counties should be aware that different points of view may exist for policy changes they may be contemplating.

## Bibliography

- Aubertin, D. Investments from a government point of view. *Proceedings of the 6th World Forestry Congress*, Madrid, 1966, 1, 1186.
- Baughman, M. J. Minnesota county forest land: alternative policies for program funding, timber sales, and land ownership. Ph.D. Thesis, College of Forestry, University of Minnesota, 1982a. 338 pp.
- Baughman, M.J. *Minnesota county forests: delphi responses to the options for program funding, timber sale, and land ownership*. (Staff Paper Series No. 35). University of Minnesota: Department of Forest Resources, 1982b.
- Baumol, W. J. On the social rate of discount. *American Economic Review*, 1968, 58, 4.
- Bingham, R. D., Hawkins, B. W., & Hebert, F. T. *The politics of raising state and local revenue*. New York: Praeger, 1978.
- Blyth, J. E., Wilhem, S., & Hahn, J. T. Primary forest products industry and timber use: Minnesota, 1973. St. Paul: North Central Forest Exp. Sta., Forest Service, U.S.D.A., 1979.
- Bolen, R. W. Personal communication. Gogebic County Forestry Commissioner, Bessemer, Michigan, November 10, 1981.
- Brodie, J. A., Bunney, R. S. M., Howie, E. L., & Parks, W. R. The relation between industry and provinces in forest management. *The Forestry Chronicle*, 1964, 40(1), 36-53.
- Browning, E. K. & Browning, J. M. *Public finance and the price system*. New York: MacMillan, 1979.
- Carlson, D. M. Office memorandum to land record users, Minnesota Department of Natural Resources, November 8, 1978.
- Carroll, M. Some aspects of the economic nature of contracts as they relate to forest land tenure in Alberta. *The Forestry Chronicle*, 1977, 53(1), 8-14.
- Clawson, M. *Decision making in timber production harvest and marketing*. (Res. Pap. R-4). Washington, D.C.: Resources for the Future, 1977.
- Clephane, T. P. Ownership of timber: a critical component in industrial success. *Forest Industries*, 1978, 105(9), 30-32.
- Crossley, D. I. Case history in forest management: first 20-year cycle at North Western. *Pulp & Paper Canada*, 1975, 76(5), 42-48.
- Dalkey, N., & Helmer, O. An experimental application of the delphi method to the use of experts. *Management Science*, 1963, 9(3), 458.
- Dana, S. T., Allison, J. H., & Cunningham, R. N. *Minnesota lands*. Washington, D.C.: The American Forestry Association, 1960.
- Ellefson, P. V., Palm, S. L. & Lothner, D. C. *Disposal of publicly owned tax-forfeited land: a Minnesota case study* (Sta. Bull. 538). University of Minnesota: Agricultural Exp. Sta., 1980.

- Ford, D. Personal communication. Minnesota Division of Forestry, St. Paul, December 4, 1980.
- Fox, B. E. *A long term timber sale policy for Michigan's state forests*. Unpublished doctoral dissertation, University of Michigan, 1980.
- George Banzhaf & Company. *Minnesota's timber resources: prospects for development* (Vol. 2). St. Paul: Legislative Commission on Minnesota Resources, November 14, 1980.
- Gordon, T. J., & Helmer, O. *Report on long-range forecasting study*. Rand Corporation Paper P-2982, 1964.
- Gray, J. A. *Pricing and sale of public timber: a case study of the province of Manitoba*. Unpublished doctoral dissertation, University of Michigan, 1969.
- Greene, J. L. The increment contract. *Southern Journal of Applied Forestry*, 1979, 3(3), 82-85.
- Guttenberg, S. To lease or not to lease your timberlands. *Forest Farmer Manual*, 1972, 31(7), 41-42.
- Harkin, D. A. The decision for public or private ownership of resources. *Land Economics*, 1972, 48(2), 144-150.
- Hotvedt, J. E., & Tedder, P. L. Use of the wholesale price index for all commodities in determining future stumpage prices under long-term leases. *Southern Journal of Applied Forestry*, 1977, 1(3), 16-18.
- Jackson, D. H. Some structural components of contracts as they relate to Canadian forest tenures. *The Forestry Chronicle*, 1977, 53(1), 33-36.
- Jakes, P. J., & Raile, G. K. *Timber resource of Minnesota's northern pine unit, 1977* (Res. Bull. NC-44). St. Paul: North Central Forest Exp. Sta., Forest Service, U.S.D.A., 1980.
- Jakes, P. J., & Vasilevsky, A. *Minnesota land ownership trends, 1962-1977* (Res. Note NC-255). St. Paul: North Central Forest Exp. Sta., Forest Service, U.S.D.A., 1980.
- Klein, E. L. Development of a hardwood utilization complex—a new approach. *Forest Products Journal*, 1971, 21(4), 16-18.
- Kobs, H. *County data*. Unpublished data, Minnesota Division of Forestry, Northern Service Center, Grand Rapids, Minnesota, 1979.
- Linstone, H. A., & Turoff, M. (Eds.) *The delphi method: techniques and applications*. Reading, Massachusetts: Addison-Wesley, 1975.
- Lothner, D. C., Kallio, E., & Davis, D. T. *Minnesota's tax-forfeited land: some trends in acreages, sales, and prices* (Res. Bull. NC-37). St. Paul: North Central Forest Exp. Sta., Forest Service, U.S.D.A., 1978a.
- Lothner, D. C., Kallio, E., & Davis, D. T. *Minnesota's tax-forfeited land: some trends in revenues and expenses* (Res. Bull. NC-38). St. Paul: North Central Forest Exp. Sta., Forest Service, U.S.D.A., 1978b.
- MacGregor, J. J. Forestry concessions in the British Commonwealth countries. *Commonwealth Forestry Review*, 1972, 51(1), 43-57.
- McCann, B. D., & Ellefson, P. V. *County-administered forestry programs in Minnesota: a review of administrative structure and procedures* (Staff Paper Series No. 19). University of Minnesota: Department of Forest Resources, 1980.
- Minnesota Department of Natural Resources. *Land ownership/classification report*. Unpublished data, St. Paul, 1978.
- Minnesota Legislature. *Report of the Legislative Interim Commission on Forest Resources and Forest Land Ownership*. St. Paul: Minnesota Legislature, January, 1961.
- Minnesota Statutes §§84A.20-42 (1982).
- Minnesota Statutes §84A.51 (1982).
- Minnesota Statutes §282.01 (1982).
- Minnesota Statutes §§282.01 (1)-(3), (7)-(8) (1982).
- Minnesota Statutes §282.018 (1982).
- Minnesota Statutes §282.02 (1982).
- Minnesota Statutes §282.04 [1] (1982).
- Minnesota Statutes §282.08 (1982).
- Minnesota Statutes §282.09 (1982).
- Minnesota Statutes §282.12 (1982).
- Minnesota Statutes §282.14 (1982).
- Minnesota Statutes §282.225 (1982).
- Minnesota Statutes §§282.38 (1)-(2) (1982).
- Minnesota Statutes §375.055 (1) (1982).
- Minnesota Statutes §459.06 (2) (1982).
- Minnesota Statutes §§477A.11-.14 (1982).
- Mitroff, I. I., & Turoff, M. Philosophical and methodological foundations of delphi. In H. A. Linstone & M. Turoff (eds.), *The delphi method: techniques and applications*. Reading, Massachusetts: Addison-Wesley, 1975.
- Muench, J., Jr. Impact of public vs. private ownership of timber land in a rural economy. *Journal of Forestry*, 1966, 64(11), 721-727.
- Mutch, W. E. S. National forestry finance in Britain: a criticism of present policy. *Scottish Forestry*, 1967, 21(4), 239-244.
- Nautiyal, J. C. Forest tenure structure in Ontario. *The Forestry Chronicle*, 1977, 53(1), 20-25.
- Netzer, D. *State-local finance and intergovernmental fiscal relations*. Washington, D.C.: The Brookings Institution, 1969.
- Pearse, P. H. *Timber rights and forest policy in British Columbia* (Vol. 1). Victoria: Report of the Royal Commission on Forest Resources, 1976.
- Rodger, G. J. Forest finance in Australia. *The Australian Timber Journal*, 1964, 21(4), 127-145.
- Scheele, D. S. Reality construction as a product of delphi interaction. In H. A. Linstone & M. Turoff (eds.), *The delphi method: techniques and applications*. Reading, Massachusetts: Addison-Wesley, 1975.
- Seth, V. K., & Rao, Y. S. New horizons of forest planning and finance. *Indian Forester*, 1970, 96(6), 444-450.

Siegel, W. C. *Long-term contracts for forest land and timber in the South* (Res. Rep. SO-87). New Orleans: Southern Forest Exp. Sta., Forest Service, U.S.D.A., 1973.

Siegel, W. C., & Guttenberg, S. Timber leases and long-term cutting contracts in the South. *Forest Industries*, 1968, 95(4), 62-64.

Slinn, R. J. *Public and private forestry enterprises in relation to national forestry production goals*. Doctoral dissertation, Duke University, 1969.

Spencer, J. S., & Ostrom, A. J. *Timber resource of Minnesota's aspen-birch unit, 1977* (Res. Bull. NC-43). St. Paul: North Central Forest Exp. Sta., Forest Service, U.S.D.A., 1979.

U.S. Bureau of the Budget. *Report on proposals for new revolving funds*. Washington, D.C.: Executive Office of the President, June 14, 1960.

7 U.S. Code Annotated §1508 (1973).

16 U.S. Code Annotated §576 (b) (1974).

16 U.S. Code Annotated §§1501-1503 (1974).

16 U.S. Code Annotated §1601 (1981). 92 Stat. §1649.

16 U.S. Code Annotated §2103 (1981).

29 U.S. Code Annotated §§801-992 (especially §812) (1975).

31 U.S. Code Annotated §§1601-1606 (1981).

U.S. Congress. *The planning programming and budgeting system—progress and potentials*. Hearing before the Subcommittee on Economy in Government of the Joint Economic Committee. Washington, D.C.: U.S. Government Printing Office, 1967.

U.S. Congress. *National timber supply act*. (S.1832). Hearing before Subcommittee on Soil Conservation and Forestry of the Committee on Agriculture and Forestry, U.S. Senate. Washington, D.C.: U.S. Government Printing Office, 1969.

U.S. Congress. *Reforestation of public and private lands* (H.R. 4498). Hearing before the Subcommittee on Forests of the Committee on Agriculture, House of Representatives. Washington, D.C.: U.S. Government Printing Office, 1979.

U.S. Department of Agriculture. *The federal role in the conservation and management of private nonindustrial forest lands*. Washington, D.C., January, 1978.

U.S. Forest Service. *Forest statistics of the U.S., 1977* (review draft). Washington, D.C., 1978.

Vasilevsky, A., & Hackett, R. L. *Timber resource of Minnesota's central hardwood unit, 1977* (Res. Bull. NC-46). St. Paul: North Central Forest Exp. Sta., Forest Service, U.S.D.A., 1980.

Wisconsin Statutes §28.11 (8) (1973).

Wright, P. W. Long-term land agreements. *Forest Farmer Manual*, 1969, 28(7), 28.

Wylie, C. W. Observations concerning the lakeview federal sustained yield unit and similar areas. *Journal of Forestry*, 1957, 55(9), 651-655.

## Appendix

### County Forest Land Ownership Policies by Factor Influencing Retention-Disposal Decisions, 1980

---

#### Timber Productivity Potential

---

County	Policy
Aitkin	Retain better land; dispose of poorer land
Becker	Retain most land unless well-suited for agriculture
Beltrami	Retain better land; dispose of poorer land, isolated 40- and 80-acre tracts, land well-suited for agriculture, industrial sites
Carlton	Retain better land; dispose of poorer land
Cass	Retain better land; dispose of poorer land
Clearwater	Retain better land; dispose of poorer land
Cook	Not important; most land is in BWCAW where timber cannot be cut
Crow Wing	Not important; retain most land
Hubbard	Retain most land; retain better land; may dispose of poorer land
Itasca	Retain better land; dispose of poorer land and land near town suited for residential or commercial use
Koochiching	Not important; retain better land
Lake	Retain better land; dispose of poorer land
Pine	Retain better land; dispose of poorer land
St. Louis	Retain better land; dispose of poorer land

---

#### Agricultural Potential

---

County	Policy
Aitkin	Dispose of agricultural land; dispose of forest land for agricultural use to expand nearby farms
Becker	Retain small areas if parcel mostly forest; dispose of agricultural land to expand nearby farms
Beltrami	Dispose of agricultural land to expand nearby farms
Carlton	Dispose of agricultural land to expand nearby farms
Cass	Not important; already disposed of land with agricultural potential
Clearwater	Dispose of agricultural land to expand nearby farms

Cook	Not important; no land with agricultural potential is owned by county
Crow Wing	Retain agricultural land if over 40 acres; dispose of smaller parcels
Hubbard	Dispose of agricultural land, including forest land suited for agriculture, to expand nearby farms
Itasca	Retain and lease land for agriculture if in memorial forest; dispose of agricultural land outside of memorial forest
Koochiching	Dispose of agricultural land, including forest land suited for agriculture, to expand nearby farms
Lake	Dispose of land well-suited for agriculture
Pine	Retain land in memorial forests; dispose of agricultural land outside of memorial forests
St. Louis	Dispose of land well-suited for agriculture; dispose of forest land for agriculture in some cases

### Mining Potential

<i>County</i>	<i>Policy</i>
Aitkin	Retain minerals, gravel, peat
Becker	Not important; little mineral potential; retain gravel
Beltrami	Retain minerals
Carlton	Retain minerals
Cass	Not important; little mineral potential
Clearwater	Not important; little mineral potential; retain gravel
Cook	Not important; mineral potential high, but most land is in BWCAW where mining is not permitted
Crow Wing	Retain minerals
Hubbard	Retain minerals
Itasca	Dispose of land with good mineral potential to mining company
Koochiching	Retain minerals
Lake	Dispose of land with good mineral potential to mining company
Pine	No policy developed yet
St. Louis	Retain minerals or exchange land to dispose of minerals

### Intensive Recreation Potential

<i>County</i>	<i>Policy</i>
Aitkin	Retain good sites
Becker	Retain good sites, especially if near urban area or if unique; dispose of some sites for commercial development
Beltrami	Retain good sites; dispose of some sites for commercial development

Carlton	Not important; not much known potential
Cass	Retain good sites
Clearwater	Retain good sites, especially water areas
Cook	Retain good sites, especially if near roads and urban areas
Crow Wing	Retain waterfront land
Hubbard	Retain good sites
Itasca	Retain good sites
Koochiching	Retain good sites
Lake	Retain good sites; dispose of some sites for commercial development
Pine	Dispose of sites suitable for commercial development
St. Louis	Retain good sites or dispose of to another public agency

### Residential, Commercial, Industrial Site Potential

<i>County</i>	<i>Policy</i>
Aitkin	Dispose of land for these purposes, especially if close to urban area, roads, county services
Becker	Dispose of land for these purposes, especially if close to urban area, roads, county services
Beltrami	Dispose of land for these purposes, especially if close to urban area, roads, county services
Carlton	Dispose of land for these purposes, especially if close to urban area, roads, county services
Cass	Dispose of land for these purposes, especially if close to urban area, roads, county services
Clearwater	Dispose of land for these purposes, especially if close to urban area, roads, county services
Cook	Dispose of land for these purposes, especially if close to urban area, roads, county services
Crow Wing	Dispose of land for these purposes, especially if close to urban area, roads, county services
Hubbard	Retain most land, but may dispose of some land for these purposes, especially if close to urban area, roads, county services
Itasca	Dispose of land for these purposes, if not needed for recreation, wildlife, memorial forest
Koochiching	Retain and lease industrial sites; dispose of residential plots if close to urban area, roads, county services
Lake	Dispose of land for these purposes
Pine	No policy developed yet

St. Louis Dispose of land for these purposes if close to urban area, roads, county services

### Fish and Wildlife Habitat Quality

<i>County</i>	<i>Policy</i>
Aitkin	Retain better quality land, especially water resources; dispose of some small parcels if there is plenty of good habitat in vicinity
Becker	Retain better quality land
Beltrami	Retain better quality land
Carlton	Retain better quality land, especially near trout streams
Cass	Retain better quality land
Clearwater	Retain better quality land, especially water areas
Cook	Not important; retain some parcels for access to good hunting areas
Crow Wing	Retain better quality land
Hubbard	Retain better quality land
Itasca	Retain better quality land
Koochiching	Not important; retain waterfowl areas
Lake	Retain better quality land
Pine	Retain better quality land
St. Louis	Retain better quality land

### Parcel Size

<i>County</i>	<i>Policy</i>
Aitkin	Not important; dispose of some small, scattered parcels
Becker	Not important; dispose of some small, scattered parcels
Beltrami	Dispose of parcels less than 80 acres for expansion of farms, businesses, residential areas
Carlton	Dispose of parcels less than 20 acres
Cass	Not important
Clearwater	Dispose of parcels less than 40 acres if many miles from larger block of county land
Cook	Dispose of parcels less than 40 acres
Crow Wing	Dispose of platted lots
Hubbard	Not important; dispose of lots near towns
Itasca	Dispose of parcels less than 10 acres if not in memorial forest
Koochiching	Dispose of most parcels less than 5 acres and some others up to 80 acres
Lake	Dispose of parcels less than 40 acres
Pine	Dispose of parcels less than 40 acres
St. Louis	Dispose of parcels less than 40 acres

### Present Use of Adjacent Land

<i>County</i>	<i>Policy</i>
Aitkin	Dispose of land to expand adjacent farms, housing developments
Becker	Dispose of land to expand adjacent farms, housing developments
Beltrami	Dispose of land to expand adjacent farms, industries
Carlton	Dispose of land to expand adjacent farms (except retain forest land), housing developments
Cass	Decide on case-by-case basis
Clearwater	Dispose of land to expand adjacent farms, housing developments, industries
Cook	Dispose of land to U.S. Forest Service to consolidate federal ownership
Crow Wing	Dispose of parcels less than 80 acres to expand adjacent farms, housing developments
Hubbard	Dispose of land to expand adjacent farms
Itasca	Dispose of land to expand adjacent farms if not in memorial forest
Koochiching	Dispose of land to expand adjacent farms
Lake	Decide on case-by-case basis
Pine	Dispose of land to expand adjacent farms, housing developments, industries
St. Louis	Dispose of land to expand adjacent farms, industries

### Adjacent Ownership (E.g., State Government, Forest Industry)

<i>County</i>	<i>Policy</i>
Aitkin	Retain land which helps create blocks of public land; dispose of isolated parcels surrounded by private land
Becker	Retain land which helps create blocks of public land
Beltrami	Dispose of land to or exchange land with other agencies or forest industries to consolidate their ownerships
Carlton	Dispose of land to other owners to consolidate their ownerships if county has no other land in area
Cass	Dispose of land to other owners to consolidate their ownerships if county has no other land in area
Clearwater	Dispose of scattered parcels to state to create blocks of state ownership
Cook	Dispose (exchange) of land to U.S. Forest Service to create blocks of federal ownership; dispose of land to expand housing developments unless needed for a park

Crow Wing	Retain land which helps create blocks of public land; dispose of isolated tracts to forest industries to consolidate their ownerships
Hubbard	Retain land which helps create blocks of public land; dispose of isolated 40-acre tracts to forest industries to consolidate their ownerships
Itasca	Retain land which helps create blocks of public land
Koochiching	Retain land which helps create blocks of public land; dispose of isolated tracts to forest industries to consolidate their ownerships
Lake	Dispose of land to other owners, especially public agencies, to consolidate their ownerships if county has no other land in the area
Pine	Retain land which helps create blocks of public land; dispose of isolated tracts to forest industries to consolidate their ownerships
St. Louis	Dispose of land to other owners, especially public agencies, to ensure access to their lands.

### Access to a Public Road

<i>County</i>	<i>Policy</i>
Aitkin	Dispose of small parcels not accessible from road
Becker	Retain parcels not accessible from road unless adjacent owner wants it
Beltrami	Retain parcels not accessible from road unless adjacent owner wants it
Carlton	Retain parcels not accessible from road unless adjacent owner wants it
Cass	Retain parcels not accessible from road
Clearwater	Retain parcels not accessible from road
Cook	Retain parcels with road access; dispose of parcels not accessible from road
Crow Wing	Not important; access is good
Hubbard	Retain parcels not accessible from road
Itasca	Not important; access is good; retain land in memorial forests; dispose of other land
Koochiching	Retain parcels not accessible from road; dispose of parcels with road access
Lake	Retain parcels not accessible from road unless adjacent owner wants it
Pine	Retain inaccessible parcels unless adjacent owner wants it
St. Louis	Retain parcels not accessible from road

### Distance to School, Police, Fire Services

<i>County</i>	<i>Policy</i>
Aitkin	Retain land far from public services

Becker	Not important; retain land not on winter maintained road
Beltrami	Not important
Carlton	Not important
Cass	Retain land far from public services
Clearwater	Retain land far from public services
Cook	Retain land close to public services; dispose of land far from public services to U.S. Forest Service
Crow Wing	Not important
Hubbard	Retain land far from public services
Itasca	Not important
Koochiching	Retain land far from public services
Lake	Not important; retain land far from public services
Pine	Not important
St. Louis	Retain land far from public services

### Distance to Large Block of County Land

<i>County</i>	<i>Policy</i>
Aitkin	Not important; retain parcels near a large block and any in memorial forest or good for recreation; dispose of isolated parcels
Becker	Not important; retain parcels near a large block; dispose of scattered 80-acre tracts good for agriculture
Beltrami	Not important; retain parcels near a large block and any good for recreation and wildlife; dispose of scattered parcels
Carlton	Retain parcels near a large block; dispose of scattered parcels
Cass	Retain parcels over 40 acres; dispose of isolated parcels less than 40 acres
Clearwater	Not important; retain parcels near a large block and any good for recreation and wildlife; dispose of small, isolated parcels
Cook	Retain parcels over 40 acres; dispose of isolated parcels less than 40 acres
Crow Wing	Retain parcels near a large block of public land; dispose of small, isolated parcels
Hubbard	Retain parcels over 40 acres; dispose of isolated parcels less than 40 acres
Itasca	Retain parcels near a large block of public land; dispose of small, isolated parcels
Koochiching	Not important
Lake	Retain parcels over 40 acres; dispose of isolated parcels less than 40 acres
Pine	Retain parcels over 40 acres; dispose of isolated parcels less than 40 acres
St. Louis	Not important; want to maintain intermingling of public land



The University of Minnesota, including the Agricultural Experiment Station, is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, creed, color, sex, national origin, or handicap.