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The Forest Resources of Iowa in 1980[1,2]

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The woodlands of Iowa have declined in area and public esteem. Iowa, at the time of settlement, was 19% forested. New immigrants and potential settlers east of the Mississippi River considered Iowa's woodlands as essential to homesteading and paid premium prices for wooded property. By 1875 forest acreage was reduced from 6.7 million acres to 2.5 million acres (2.7 million to 1.01 million hectares). This acreage apparently did not change appreciably until the 1950's. In the last twenty years to the present forest area has been reduced another million acres to 4% of Iowa's land area. The current rate of removal of woodland is most severe in the least forested counties. The changes in public opinion respective to woodlands are discussed and present problems and future perspectives defined.
INDEX DESCRIPTORS:Woodland, Woodlot, Iowa Forests, Forest Inventory, Natural Resources.

PROLOGUE

"The people would act today if the situation were clearly understood. The question is whether we do the right thing now or wait until the expense shall have increased a hundredfold. The preservation of springs and streams and forests will one day be undertaken as freely as the building of fences or bridges or barns. When that day comes, Iowa, once so fair in her virginal beauty of wild-flowered meadow and stream-washed groves, now so rich in all that comes from tillage and toil, will put on yet an added splendor in that all her toil and tilth shall yield to wisdom's guidance; forest and meadow shall receive each in turn intelligent and appropriate recognition; beauty will become an object of universal popular concern, and once again across the prairie state the clarified waters of a hundred streams will move in perennial freshness toward the great river and the sea."
— Dr. Thomas H. MacBride in his President's address to the Iowa Academy of Science in 1897.

HISTORICAL PERSPECTIVE

Pre-settlement

With the exception of the eastern part of the State and those lands adjacent to navigable rivers the settlement of Iowa was delayed, at least in part, because timber, one of the three legs on which settlement of a frontier traditionally advances, was in short supply. Land and water were abundant but the supply of wood so urgently needed for construction, fencing and fuel was far less available than that to which settlers east of the Mississippi had been accustomed.

Our present day knowledge of the pre-settlement forests of Iowa comes largely from the turn-of-the-century writings of the botanist-conservationists, Professors L.H. Pammel of Iowa State University and Thomas H. MacBride of the University of Iowa. The effort expended by Professor Gilmour MacDonald of the Department of Forestry at Iowa State University in 1933 when he analyzed the 1832-1859 survey notes of the General Land Office provides us with the only quantitative record of the extent of forest land prior to settlement.

In as brief a form as possible, and largely devoid of the fascinating color provided by the journals of early settlers, a description of the early forests of Iowa follows.

Iowa was and is essentially a prairie state with the forest located either in the east where the available moisture is greater or along the bottomlands and on the slopes adjacent to streams. One has the impression that the forests invaded from the south by progressing up the river valleys and advancing up the slopes until stopped by the sweep of winds and fire of the upland prairies. The unglaciated region of north-eastern Iowa, the south-east corner of the state and the drainages of the Iowa, the Skunk and the Des Moines rivers were and still are the areas of the state most significantly forested.

Probably the most reliable estimate of the state's original woodland acreage[3] is 6,680,926. This was determined by finding the proportion of each section line that was identified as falling in woodland when the original G.L.O. survey was made. This approximates Dr. Pammel's 1894 estimate of "five to six million acres" (Pammel 1896) for the pre-settlement forest area.

All authorities from 1890 to date have concluded that the acreage of forest land actually increased after the prairie fires of either natural or Indian origin were brought under control. There is abundant evidence of this when we note that there are bur oak (a pioneer species) stands on hot, west-facing slopes that are of an age matching settlement; that many old open grown oak trees are now surrounded by a forest of trees generally matching settlement times; that the belt of forest is commonly wider on the east side of major rivers than on the up-wind, or fire, side to the west. It is a commonly noted fact that grasslands and native prairies escape the invasion of woody plants only if periodic burning (or some other cultural practice) is carried out.

The magnitude of the increase of forest land after settlement has never been estimated and is now a moot point because woodland

[1]Based on a contribution to the symposium "Perspectives on Iowa's Declining Flora and Fauna" held at the 92nd session of the Iowa Academy of Science, 18 April 1980.

[2]A longer version of this paper was presented by State Forester H. Gene Hertel and the author on October 9, 1979 at a special meeting of the Iowa Natural Heritage Foundation in Des Moines, Iowa.

[3]The use of acres rather than hectares (1 hectare = 2.471 acres) stems from the fact that the unit of linear measurement in the original and subsequent land surveys of the United States was the *Gunter chain*. The *chain*, as a unit of length, is 66 feet or 4 rods. Area computations utilize decimal conversions in that one square chain is one-tenth of an acre, or 4356 square feet. Thus there are 43,560 square feet per ten square chains or one acre. Land descriptions outside of cities and excluding the original colonies and certain grant lands utilized the Gunter chain which, at 80 chains per mile, establishes where forty, section and township lines fall. Farm to market roads in Iowa are customarily a mile apart because they are located on the section lines surrounding 640 acres. Metric conversions as a computational artifice fail to portray the logic of the land surveys that preceded settlement and remain today as the legal basis for ownership and management.

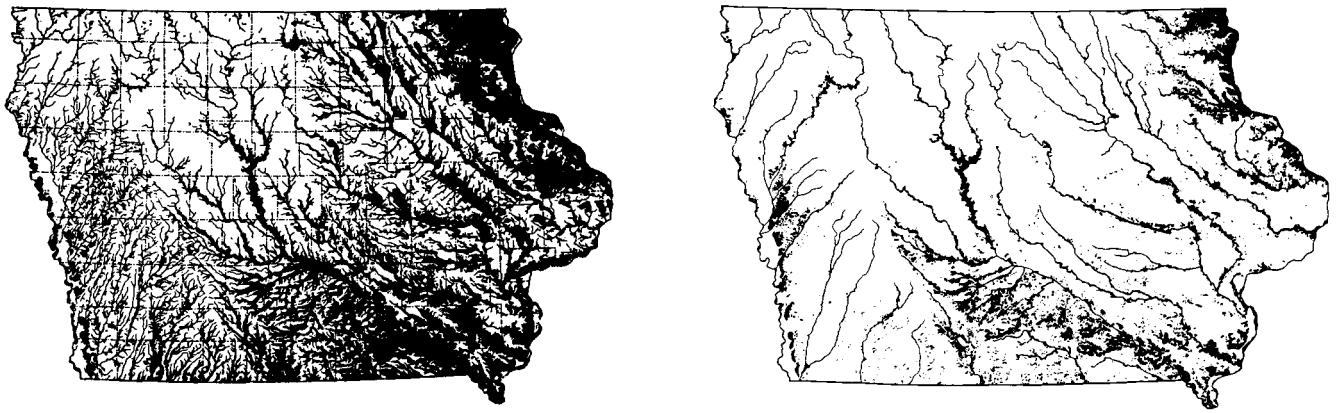

Fig. 1. *A comparison of Iowa's forest cover between the time the state was surveyed (left), as presented in Iowa State Planning Board (1935); and 1976 (right), as modified by Peck, J.H. (1976) from Land-Use in Iowa, Miscellaneous Map Series 5, Iowa Geological Survey (1976).*

clearing is so far advanced that the present forest area is only 1,561,000 acres. From a probable forest acreage of 19 percent of the state's land area we are now reduced to no more than 4 percent. The two maps of Iowa showing forest cover at the time of settlement and in the 1970's portray the loss of our woodlands more clearly than any amount of tabulation. See Figure 1.

It is easy to assume, in our nostalgic view of the past that the primeval forest of Iowa was composed of "towering oaks and verdant vales." It was this romanticized view that was purveyed to many potential settlers from the eastern United States and the potential immigrants from Europe. In John B. Newhall's "A Guide for Englishmen" (Black 1944) prevalent in the period of 1832 to 1844, is this description of the Iowa scene: "— grassy lawns and verdant vales, interspersed with towering oaks — the river tumbling its crested foam over preciptious ledges of cragged rocks — the spiral cliffs and mossy ledges grouped in fantastic forms amidst the cultivated valley."

Dr. MacBride (1895) provided a far more reliable description of the pre-settlement forest in his "Landscapes of Iowa" and his 1897 report on the "Forests in Iowa" (MacBride 1897). Despite his comment that the nearly pure white oak stands growing on clay ridges were characterized by openness (" — the trees opened on every hand as in a royal park."), he was not impressed by the forest of Iowa in 1850:

> "There were wooded areas, but these were generally disconnected and limited to particular regions, such as the banks of the preennial streams, clay hills, sandy and rocky ridges. The spread of timber was prevented by prairie-fires. Where the grass was heavy these were excessively hot, so that trees could maintain themselves only where the grass was scanty; that is, where the soil was thin or barren. Moreover, the trees were for the most part scattered. As far as trees were concerned, one could drive or ride anywhere through the primeval woods of Iowa, except, perhaps, immediately along the borders of streams. The greater number of the trees were old; they were low, often scrubby, storm-tossed, often scarred by fire, of little value. In fact, it is believed by some that prior to 1850 the forest in Iowa, such as it was, was actually retreating, dying out, before the stress of fire and storm."

Post-settlement

Settlement of the forested lands of the Ohio Valley and east was a matter of clearing land to provide for crops for human consumption, for feed for livestock, to open a "field of fire" against marauders and, perhaps not the least in importance, to escape the often terrifying confines of the wilderness as described by Richter (1946): "All she knew was the ever forest where the roads were dim paths coaxing you to come on while the monster brown butts stood still as death waiting for you to get lost." It is doubtful if any settler would have chosen a wooded acreage over one which was in grassland unless he was so accustomed to the terrain of New England that rough and wooded land seemed like home (Thomson 1974).

However, when Iowa was settled property in close proximity to a supply of wood was much in demand. It was said that lack of wood for fencing slowed immigration because it could cost $340 to fence forty acres and this was the heaviest "tax" imposed on the land. Dr. MacBride wrote of Cedar County in 1850 to 1870: "Wooded lands were worth $100 per acre when the finest prairie could be had for the asking." In 1856 along the path of a proposed right-of-way (presumably railroad), " — the timber lands of this section are all secured, nothing remains but prairie. The woodlands must be purchased at second rates from $8 to $15 per acre."

In Nathan H. Parker's "Iowas As It Is in 1856: A Gazetteer for the Citizen and a Handbook for the Immigrants" this statement is made of Story County: "The unequal distribution of the wooded land is a greater objection than its actual quantity. Sometimes the prairies are from 20 to 40 miles in width, thus making timber inconvenient. These however, are rare cases."

Settlement from 1850 to 1875 probably reduced the original forest acreage relatively little. Because of the abundance of rich, prairie land most farms could be established without resorting to forest clearing, although ownership adjacent to woodland property was desirable for lumber, fuel and fencing. As stated, Iowa's woods were confined to either flooding bottomlands or to steep slopes. Even on tillable land the woodland soils were either shallow, rocky or so poorly drained that conventional farming was a poor alternative. Sawmills were slow and widely scattered and probably made less impact on woodland acreage in a negative sense than the control of prairie fires did in a positive sense. The pineries of Wisconsin were producing vast volumes of white pine for the great mills along the Mississippi so the need for locally sawed hardwood was neither great nor of long duration at the time of most active settlement.

By the mid-1870's, however, the decline of forest area in Iowa began in earnest. Pine lumber became increasingly expensive so that lumber-

Table 1. *Estimated forest acreage in Iowa at four periods (1832 to 1974)*

County	Forest Area in Acres 1832-1859 Surveyor's Notes	1875 Andreas Atlas	1954 Iowa Survey U.S.F.S.	1974 Iowa Survey U.S.F.S
1. Adair	32,768	8,529	12,000	6,200
2. Adams	36,147	10,392	16,000	7,600
3. Allamakee	376,220	61,107	132,000	101,800
4. Appanoose	133,760	63,340	56,000	30,500
5. Audubon	13,516	4,132	4,000	1,300
6. Benton	64,204	23,558	20,000	15,300
7. Black Hawk	49,280	19,875	17,000	12,900
8. Boone	62,080	22,067	30,000	22,400
9. Bremer	47,360	24,899	15,000	12,600
10. Buchanan	64,307	33,553	17,000	11,200
11. Buena Vista	1,200	799	5,000	2,400
12. Butler	39,680	12,228	15,000	9,300
13. Calhoun	3,000	765	2,000	600
14. Carroll	10,320	2,680	5,000	1,000
15. Cass	30,720	4,442	9,000	2,700
16. Cedar	76,000	22,706	23,000	15,600
17. Cerro Gordo	21,760	5,872	4,000	900
18. Cherokee	5,720	1,377	11,000	4,700
19. Chickasaw	85,500	22,125	16,000	8,100
20. Clarke	55,560	24,251	39,000	22,500
21. Clay	3,300	1,368	8,000	3,900
22. Clayton	366,340	117,213	120,000	84,400
23. Clinton	80,896	30,710	30,000	24,000
24. Crawford	10,810	5,010	14,000	4,600
25. Dallas	64,640	23,855	36,000	19,200
26. Davis	200,640	99,625	51,000	26,800
27. Decatur	126,000	45,620	57,000	29,200
28. Delaware	111,615	44,163	27,000	19,400
29. Des Moines	125,340	65,991	40,000	26,000
30. Dickinson	1,980	1,845	4,000	600
31. Dubuque	201,825	81,185	56,000	38,200
32. Emmet	4,000	1,976	4,000	2,700
33. Fayette	126,770	47,875	38,000	28,000
34. Floyd	62,800	20,238	9,000	7,700
35. Franklin	16,000	7,621	4,000	3,300
36. Fremont	57,139	23,368	31,000	14,000
37. Greene	25,440	10,708	12,000	6,400
38. Grundy	640	2,718	1,000	700
39. Guthrie	44,032	15,128	38,000	25,500
40. Hamilton	19,520	10,376	9,000	6,200
41. Hancock	8,960	2,173	3,000	900
42. Hardin	43,520	20,530	14,000	9,500
43. Harrison	64,380	29,930	44,000	30,500
44. Henry	114,995	57,191	36,000	23,000
45. Howard	51,920	13,142	11,000	6,500
46. Humboldt	4,800	2,476	6,000	2,500
47. Ida	640	591	2,000	500
48. Iowa	90,315	29,081	30,000	18,200
49. Jackson	282,420	80,285	82,000	57,600
50. Jasper	68,800	83,146	31,000	12,000
51. Jefferson	143,250	69,429	37,000	17,800
52. Johnson	108,545	47,925	41,000	25,200
53. Jones	136,705	48,007	42,000	28,300
54. Keokuk	116,531	42,688	35,000	16,000
55. Kossuth	3,840	2,319	8,000	2,500
56. Lee	179,100	60,596	81,000	50,700
57. Linn	153,600	64,078	46,000	32,300
58. Louisa	101,065	48,111	41,000	22,200
59. Lucas	64,640	27,206	51,000	31,700
60. Lyon	1,000	230	4,000	1,700
61. Madison	72,800	23,687	50,000	26,000
62. Mahaska	111,360	44,124	31,000	15,500
63. Marion	131,060	57,586	52,000	26,700
64. Marshall	32,320	16,771	14,000	8,500
65. Mills	50,790	29,584	25,000	12,700
66. Mitchell	66,355	10,084	10,000	5,000
67. Monona	49,130	8,972	48,000	25,100
68. Monroe	86,400	49,213	71,000	34,400
69. Montgomery	36,864	11,656	10,000	4,700
70. Muscatine	90,820	31,285	30,000	19,200
71. O'Brien	1,500	—	4,000	1,300
72. Osceola	640	—	2,000	100
73. Page	51,200	25,188	12,000	7,300
74. Palo Alto	5,600	1,646	6,000	1,500
75. Plymouth	3,640	365	12,000	5,200
76. Pocahontas	2,200	951	1,000	800
77. Polk	67,200	34,218	32,000	17,300
78. Pottawattamie	51,814	20,681	27,000	13,900
79. Poweshiek	33,600	18,379	17,000	7,600
80. Ringgold	50,030	21,387	27,000	15,200
81. Sac	2,200	2,916	6,000	1,700
82. Scott	43,000	14,835	15,000	10,800
83. Shelby	16,690	6,184	5,000	1,800
84. Sioux	700	—	3,000	1,000
85. Story	37,440	9,468	13,000	5,500
86. Tama	79,680	20,283	30,000	19,800
87. Taylor	57,036	22,873	21,000	10,300
88. Union	28,800	11,330	22,000	15,400
89. Van Buren	201,730	85,189	64,000	38,200
90. Wapello	145,280	51,734	49,000	23,300
91. Warren	82,640	47,719	44,000	24,200
92. Washington	94,412	41,762	37,000	18,700
93. Wayne	56,440	27,509	27,000	15,900
94. Webster	46,080	8,967	26,000	17,900
95. Winnebago	5,120	2,190	3,000	300
96. Winneshiek	152,780	44,360	56,000	39,800
97. Woodbury	19,860	6,005	25,000	14,500
98. Worth	9,220	6,475	5,000	1,600
99. Wright	8,640	3,793	6,000	2,600
TOTALS	6,680,926	2,524,793	2,620,000	1,561,300

ing of hardwoods became profitable. Barbed wire was invented and it became common practice to fence cattle *into* woodlands as a cheap pasture. Most significantly the western extension of railroads made severe inroads in the forest volume. It was estimated that one mile of railroad track required a forest of 800 average size oak trees for ties alone. It is uncommon now, and was no more likely then, to find as many as 200 mature (12 inches in diameter) oaks per acre so something like six acres of woodland would have to be cut for each mile of railroad. General Agent Howard Miller of the Union Pacific Railroad (Miller 1893) estimated in 1893 that railroad construction in the United States used up one-fifth of the forest area of the country as 180,000,000 trees were required every ten years to supply the need for ties, timbers and telegraph poles.

CURRENT SITUATION

The following table shows a county by county estimate of the woodland acreage of Iowa according to the most recent, 1974, forest inventory (Ostrom 1974) and, by comparison with the previous inventories and estimates (Thornton and Morgan 1959; USDA Forest Service 1978) delineates the inexorable decline of our forest cover. See Table 1.

Until the advent of truly large equipment at the end of World War II forest acreages probably did not suffer the catastrophic decline that has been evident over the last twenty years. However, the selling off of the best trees through high grading and the years of unrestricted grazing which inevitably led to compacted soils and reduced canopy density led to the deterioration of forest quality. Wood for fuel was harvested by most forest owners but even so, the woodland was usually considered an undesirable burden of no income potential. Decades of neglect and mismanagement conspired to produce a forest that was most often classified as "wasteland."

It was little wonder that farmers and highway designers elected to locate highways through woodland instead of crop and pasture land. When crop land became both expensive and limited, it was inevitable that pastures would be plowed and the already sparse woods thinned for pasture. As equipment became bigger still and crop land prices reached unheard of levels, it became inevitable that forests would be cleared to the edges of ravines and to the banks of streams and the bulldozing of entire woodlots would become feasible.

Table 2 verifies the expected. In counties of abundant woodland, recent land clearing has gone on at a slower pace than in those counties where soils are better, land is more level and forest groves are smaller and narrower. As a consequence, where woodland acreages are already sizeable there is little available farm land yet to be cleared but where forests are scarce the soil is well adapted to further conversion of forest to field. See Table 2.

Table 2. *Forested area lost as function of 1974 forest cover. U.S. Forest Service Data.*

1954 Percent Forest Cover	Counties	Total Area, Acres	Forest Area, Acres 1954	Forest Area, Acres 1974	Percent of 1954 Forest Lost by 1974
More than 20%	Allamakee Clayton Jackson	1,317,600	334,000	243,800	27.0
11 to 19%	Clark Dubuque Marion	1,029,700	147,000	87,400	40.5
1 to 10%	Adair Guthrie Pottawattamie	1,361,500	77,000	45,600	40.7

It can be assumed that some counties in Iowa will be rendered almost treeless except for farm-stead plantings in rural areas and shade tree planting in towns. The necessity to increase immediate income to pay for large, expensive machinery and high priced farm land dictates farming practices which lead to the clearing of fence rows, the narrow "stringers" of forest along ravines and waterways, and those woodlands thought to be capable of producing pasture or cultivated crops.

There is a trend toward urban expansion into forested areas. While a wooded lot commands a premium price and the trees are generally preserved, it is unrealistic to include these urban acreages as a part of Iowa's forest. Characteristics of naturalness, wildlife habitat, access to the public, production of lumber, and protection of watershed all seem to be diminished by the quasi-urban use.

FUTURE PERSPECTIVES

During the depression years of the '30s and the succeeding years of federal acquisition by the U.S. Forest Sercice of depleted lands there was considerable discussion of Purchase Units in southern and southeastern Iowa. None of the proposed Units were ever acquired and, as a consequence, Iowa remains as one of only three states east of the 90th meridian with no U.S. Forest Service land. The Division of Lands and Waters, within the Iowa Conservation Commission, manages 51,300 acres of commercial forest land as State Forest. The lack of sustained and professional management from the federal sector and the limited amount of state-owned forest land has most assuredly accounted for the relatively low acceptance of forest management in Iowa.

While it is unrealistic to assume that there will be interest in establishing National Forests in Iowa, it is not unreasonable to assume that sizable additions might be made to the State Forest holdings.

If funds for purchase and appropriations for manpower could be increased, the management of the Iowa forests would be improved and this valuable resource sustained. But left to the short run economic demands of farm owners, it can be imagined that forest land will be steadily converted to other uses.

An unknown, but we suspect significant, area of forest is owned by nonprofit groups to whom the idea of tree removal is repugnant. Many absentee owners or second-home owners undoubtedly consider their forest properties as desirable assets entirely independent of their wood producing capabilities. Whatever the total acreage owned by the foregoing, it may be assumed that forest cover will be maintained in a degree of management that varies from sophistication to benign neglect. But as found in other midwestern states, there will be a continued reluctance to harvest trees even where this may be done on a profitable, beneficial and continuing basis. This reluctance can be accounted for by 1) primary interest in aesthetics, 2) the feeling, held by some, that the harvesting of trees is contrary to responsible land management, and 3) ignorance of forest product markets or inexperience in seeking them out.

On the near horizon can be seen two conditions that may further deplete the woodland. First: The energy shortage plus the new found interest in fireplaces and wood burning stoves may combine to reduce both forest density and woodland acreage. Initially it was supposed that a better market for low quality hardwood would contribute to improving the residual forest by allowing sanitation cuts and cleaning of the woodlot. Now there is a concern that this market improvement may merely pay for accelerated land clearing.

Second: The increase in federal forest set-asides for Wilderness, with the consequence of reducing annual allowable harvest from National Forests, is expected to increase the demand for wood and fiber from the largely farmer-owned woodlots. This will be an additional incentive to Iowa's woodland owners to market forest products. This could be used as an excellent opportunity to improve the woods and increase enthusiasm for forestry. If increased marketability of the wood merely

provides funds for land clearing then Iowa's forest resource will be further reduced.

Beyond a doubt there are certain classes of land now in woodlands that are too steep, too rocky or too susceptible to flooding to allow for any other use than forest cover.

PROBLEMS

There are opposing views of proper resource management when clearing of Iowa's forested lands is considered. There is sound logic in turning land to its highest economic use if the owner's income derives from the yield of the land. Corn, beans and pasture each produce an immediate, familiar, easy-to-market crop that appeals to farmers interested in maintaining their farms as a going concern. Similarly, converting woodlands to the sub-divider's building lots has a one-operation simplicity that appeals to farmers wishing to abandon or curtail their farm enterprise.

The citizens whose incomes derive from activties other than farming or real estate visualize only despoilation of nature when removal of trees takes place. They see, not a loss of income, but instead reduction of wildlife habitat, potential soil erosion, removal of aesthetic variety and, although somewhat less clearly, the loss of such woodland commodities as lumber, veneer logs, chip-wood, posts and fuel.

Hugh Raup (1966) in his respected article, "The View from John Sanderson's Farm," comments that there are two deep cleavages between theory and reality in respect to forest ownership. One is the moral issue of which Raup writes, "Only in the last century or so, with the rise of conservation thought in all its manifestations, has man confronted himself repeatedly with the accusation of sin against the same 'nature' and 'land' that were for so long his arch enemies. This sin has had to be defended by whatever means came to hand — scientific research, favorable cost-benefit ratios, or simple economic necessity. . . . Another deep cleavage is caused by sharp differences in the time spans of management. When the conservationists began talking and writing about 'the future,' and providing resources for it, their 'future' was not on any time horizon visible to a farmer, or manufacturer, or businessman."

The recreational and scientific benefits derived from Iowa's forest lands are being lost and lands are cleared. "Probably no other element of conservation planning is so important as 'forest conservation,' the conservation of Iowa's woodlands. This fact is due to the dependence of all other elements upon the restoration and preservation of trees and small growth (Crane 1933).

Two-thirds of Iowa's forest land is owned by farmers. Another twenty-four percent is owned by industrial and other nonfarm landowners. The government agencies, federal, state, county and municipal, own eight percent (Ostrom 1974). The rapid decrease in woodland in Iowa is largely occurring on the privately owned land. The change of land-use from forest to other uses is the overriding problem facing the resource. The enigma and fascinating challenge of attempting to preserve some significant level of forest land in Iowa lies in the fact that the majority of forest is in the hands of those who least wish to retain it.

Overall it seems apparent that society, without the *will* to practice conservation, will not respond to legislated incentive programs and if will exists after the resource has vanished our efforts and skills become purely academic.

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