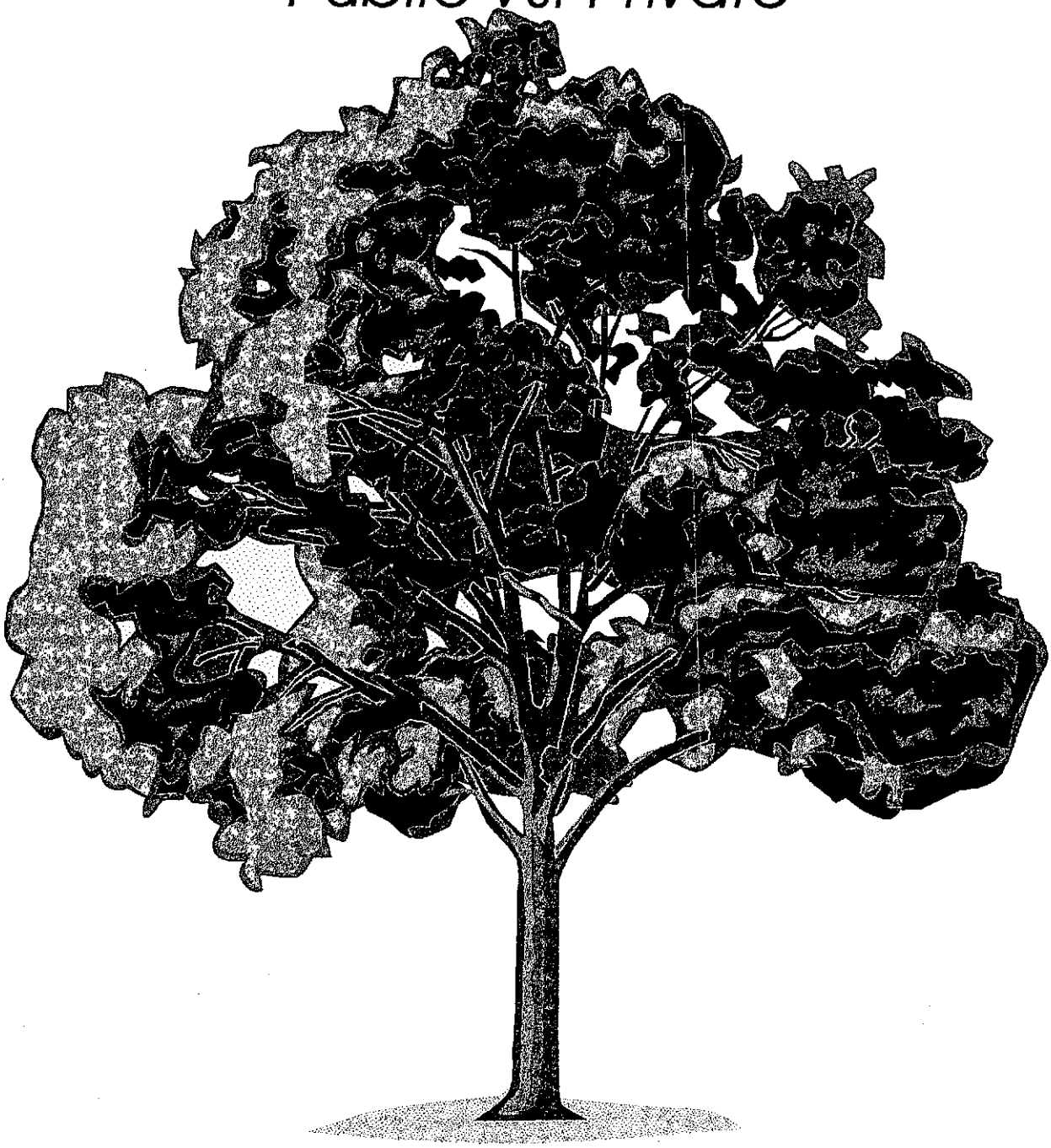
Timbering in Indiana:

Public Vs. Private



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Preface

As early as the 1600's, historic records indicate forests covered approximately 85 percent of the state of Indiana. This period was about the time European settlement began on the eastern seaboard (Timber Stand 7). Early timber harvests filled a variety of pioneer needs: fencing material, fuelwood for cooking and heating, planks for flatboats, bridges, furniture, etc. Then in 1860, Indiana's land base included about 20 million acres of forest and two million acres of prairie. However, by 1860, Indiana looked very much like it looks today. Nearly 16 million acres of forest had been burned or cut to make space for croplands, communities, and transportation. Then, in 1922, Indiana State Forester, Charles Deam, predicted the state would be treeless in 15 years (Timber Stand 8). Fortunately, he was wrong, for Indiana's forests are resilient. Future efforts to preserve the public's forest is dependent upon Hoosiers' ability to demand it. Our research covers the following aspects necessary to the forests' resiliency: timber resources and owners, after a harvest, private management, other states' programs toward private owners, and the debate of what is private land. These chapters will encompass the current issues surrounding timbering in Indiana.

Section 1

An Overview: Resources and Owners

Jessica Avery

According to Diamond and Noonan, land use problems in the United States are "a silent crisis, a quiet specter, but nonetheless a challenge that affects the well-being of virtually every human being" (Koontz 1). Recently, concern over diminishing amounts of forestland because of harvesting has grown statewide. Yet, while the ecological and social concerns are well-founded, the timber industry still plays an intricate role in the state's economy. According to Forest Health Highlights, Indiana ranks third in the nation in hardwood production, contributing $4 billion annually to the economy; furthermore, timbering is the sixth largest manufacturing industry in the state. Thus, many Indiana citizens owe their livelihoods to the timber industry, and a dramatic decrease in harvesting could cost 44,000 Hoosiers their jobs (Spencer 20). Thus, policymakers are now working hard to find plans that can protect environmental aspects of the forests while also maintaining a strong timber industry. This paper aims to provide an overview of Indiana's timber resources while also providing the background and harvesting experiences for private and state lands; with this information, policymakers can better identify important trends among groups and better understand the current situation, both of which are necessary to forming successful policy.

TIMBER RESOURCES

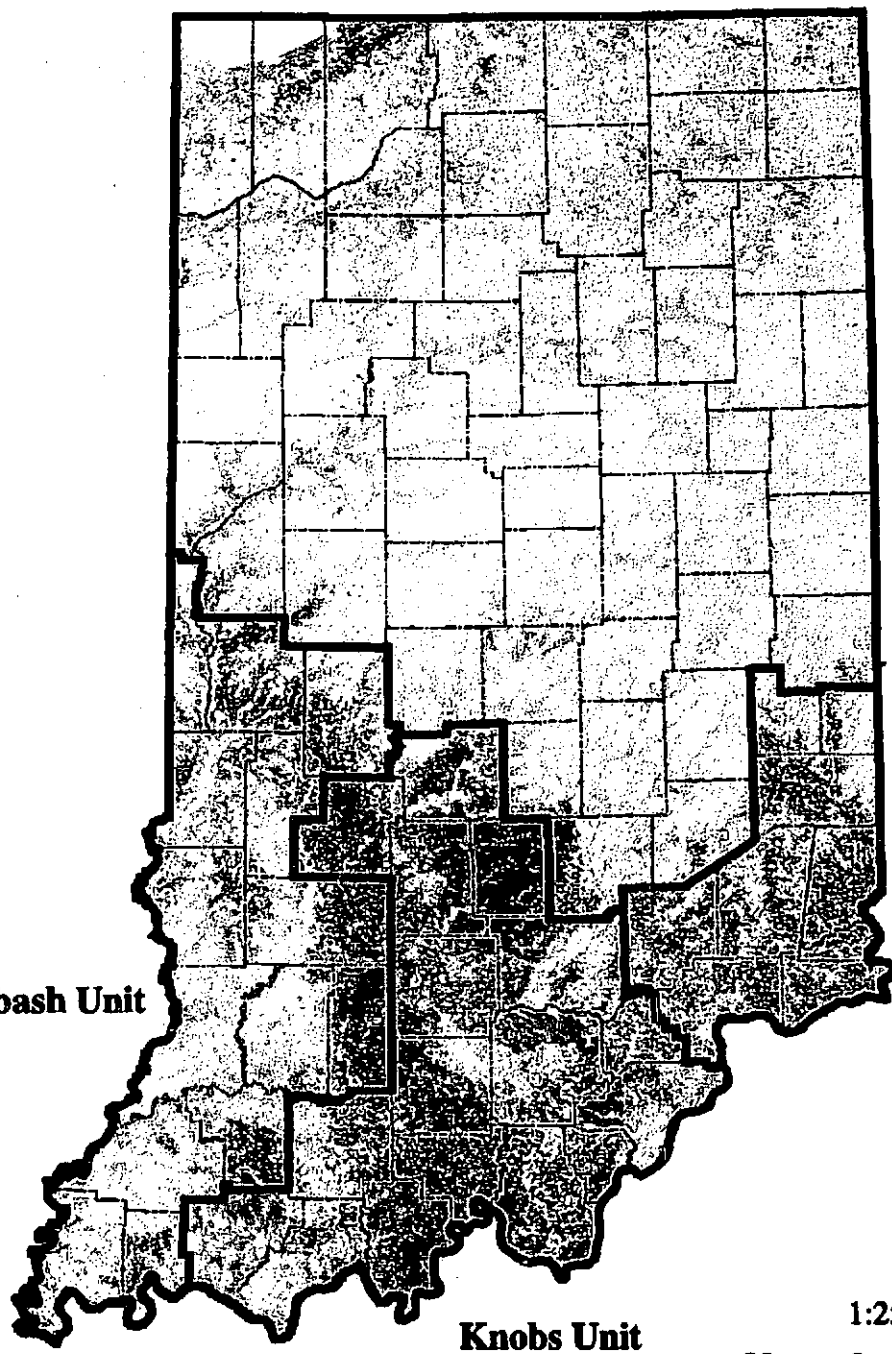
After facing mass destruction less than a century ago, Indiana's forests have made vast progress and have grown into a beautiful, biologically diverse, and productive ecosystem. Currently, Indiana has more than 4.4 million acres of forestland; 4.3 million of those acres are considered timberland, an area that can grow at least 20 cubic feet of industrial wood per acre per year (Evergreen 4). According to the Wood Research Laboratory at Purdue University, forestland acres have increased by 10 percent during the past 30 years. To understand this growth, the demographics of Indiana forests must be examined

Survey Units

Indiana's forestland has become increasingly difficult to monitor; thus, state and federal agencies have divided the forests into four Survey Units: Knobs, Northern, Lower Wabash, and Upland Flats (see Figure 1 on following page). The following table demonstrates how most growth occurs in the three southern units south of Indianapolis by showing the forested area of counties by forest survey unit.

FIGURE ONE

Indiana's Forest Land by Forest Survey Unit



Map 1

1:2500000

20 0 20 40 Miles

Source Data

County Boundaries from U.S. Census Bureau TIGER files

Forest Survey Units from Indiana's Timber Resource, 1986: An Analysis Resource Bulletin NC-113 United States Department of Agriculture

Forested Areas from Indiana Gap Analysis Project

County Boundary

Forest Survey Unit Boundary

Forests

TABLE 1

FORESTED ACRES PER COUNTY

Forested Area Per County (Acres)	Lower Wabash # of Counties	Knobs # of Counties	Upland Flats # of Counties	Northern # of Counties
>90,000	4	13	5	0
40,000-90,000	7	4	1	10
20,000-40,000	3	0	2	18
<20,000	0	0	1	24
Total	14	17	9	52

Source: Indiana Forest Legacy Program Assessment of Need, (1998), p.6.

As the chart demonstrates, Knobs Unit contains the most forested acreage, with 45 percent of the state's growing stock; Lower Wabash, Upland Flats, and then Northern follow (Evergreen 4). Indiana's climatic history plays a major role in this statistic. During the Ice Ages, glaciers reached only Martinsville, leaving the area south of the city extremely hilly and thus difficult to farm. Farmers originally cleared the trees and established farms on these hills, but they eventually abandoned their lands because they were unprofitable. Thus, these former farms have now been reforested and make up a large percentage of Indiana's forestland.

While the southern units boast the largest amounts of forestland because of poor agricultural capabilities, other forms of land transformation still affect them. The following chart demonstrates how the regions have fluctuated in their timberland areas.

TABLE 2

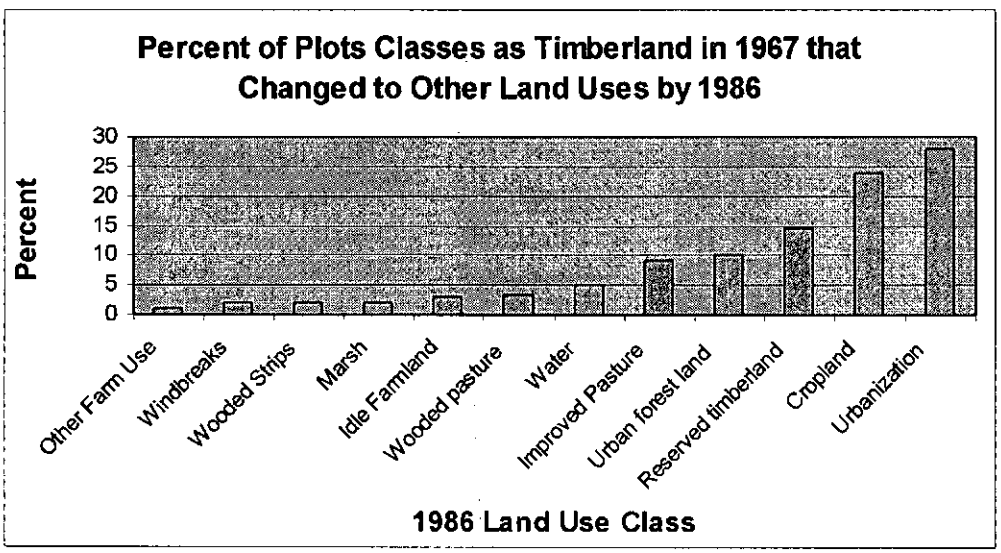
ACREAGE FOR SURVEY UNITS, 1950-1986

Forest Survey Unit	1950 Area (1000 ac)	Percent	1967 Area (1000 ac)	Percent	1986 Area (1000 ac)	Percent
Lower Wabash	795	19.2	836.2	21	860.4	20
Knobs	1705	41.2	1769.2	46	1741.1	40.5
Upland Flats	457	11	353.7	9	571.1	13.3
Northern	1183	28.6	936.7	24	1123.2	26.2
TOTAL	4140	100	3895.8	100	4295.8	100

Source: Indiana Forest Legacy Program Assessment of Need, (1998), p.7.

Over the years, the distribution of the land has shifted. The biggest shifts between 1950 and 1967 take place in the Northern Unit as expected. More than likely, the changes result from the continued conversion of forestland into prime agricultural land, for the land is flatter and more easily farmed in the northern half of the state. However, the biggest losses occur in the southcentral part of the state between 1967 and 1986. While this at first appears unexpected, it demonstrates the role of urban sprawl in Indiana. Most of the losses in the area are within a relatively short distance of metropolitan statistical areas (Forest Legacy 7). Thus, as urban areas continue to expand, people as well as commercial businesses in cities like Bloomington and Columbus are moving outside the city limits into other areas within driving distance. As this transition occurs, timberland must be deforested to accommodate these changes. The following chart demonstrates the non-proportional effect that urbanization has had on forestland:

FIGURE 2



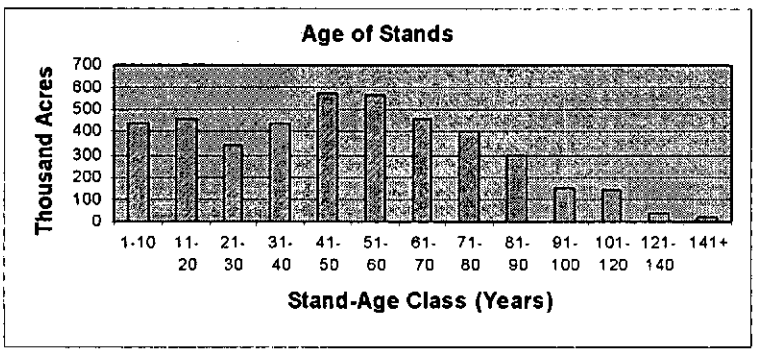
Source: Spencer J. and N. Kingsly and R. Mayer. Indiana's Timber Resource: An Analysis, (1990), p.2

While 87 percent of Indiana's forestland in 1967 was still forested in 1986, nearly a third of the remaining 13 percent switched to an urban classification. Thus, urbanization is the biggest threat to forestland at the present time, and its effects have clearly been observed in the most forested part of the state.

Age Of Stands

While land has fluctuated between units over the years, Indiana's forested acreage is now increasing. A major reason for the growth is more owners now place more emphasis on improving management quality, and a proper method to measure this is by examining the age of trees in Indiana forests. Current landowners have started to place growing importance on improving the quality of younger timber stands by letting them age properly. The following graph presents information on the area of timberland by stand-age class as of 1986.

FIGURE 3



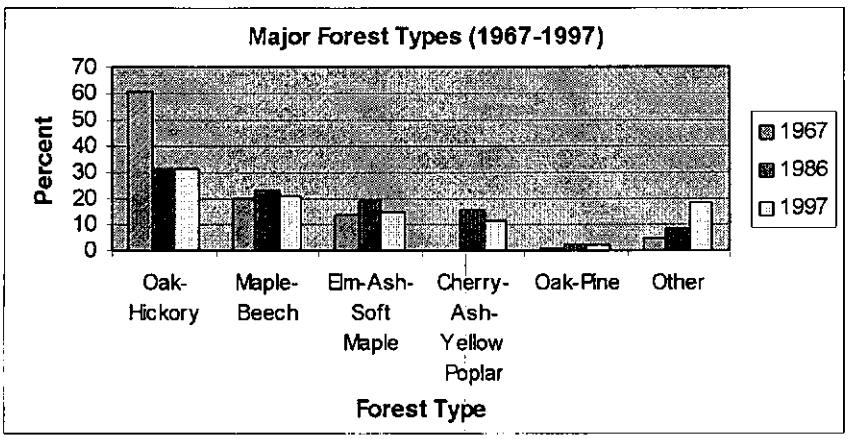
Source: Spencer J. and N. Kingsly and R. Mayer. Indiana's Timber Resource: An Analysis, (1990), p.2

The age of trees in Indiana forests is relatively equal up to age 90, although more than 50 percent of the timberland is less than 51 years old. After age 90, the forest acreage decreases dramatically. While this graph cannot tell the entire story, two possibilities exist as explanations for this trend. First, it suggests that more owners are letting their valuable hardwoods mature properly; for example, oak-hickory should only be harvested after it reaches 90 years in age (Spencer 7). Thus, a decrease after 90 years would be expected. Secondly, the strong conservation movement for Indiana forests began at the turn of the century, approximately 90 years ago. Thus, these numbers also possibly imply that the number of trees in the 91+ stand-age class will increase over time; however, this hypothesis cannot be tested properly until the release of the long-awaited U.S. Forest Service Forest Inventory and Analysis.

Forest Types

After observing the distribution of trees based on age, the next step is to look at the breakdown of different types of tree species found in Indiana forests. Throughout the state, thirteen different forest types exist (Forest Legacy 7). However, four species dominate: oak-hickory, maple-beech, elm-ash-soft maple, and cherry-ash-yellow poplar. The following chart shows the distribution of forest types over a 30-year period and the resulting changes.

FIGURE 4



Source: Indiana Forest Legacy Program Assessment of Need, (1998), p.9.

As the graph clearly demonstrates, in 1967, oak-hickory dominated forests, comprising nearly 60 percent of all forestland. Since then, however, the percentage has decreased dramatically, and maple-beech trees are now nearly as predominant.

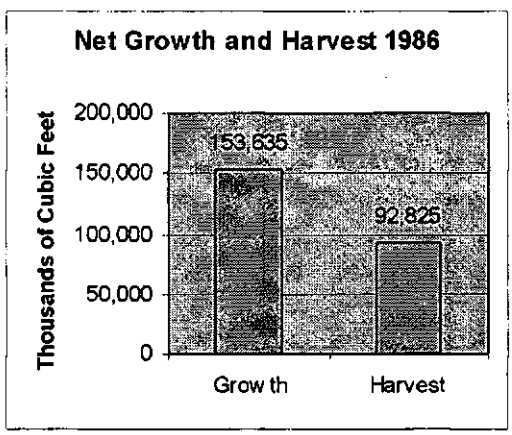
Oak-hickory is a valued Indiana hardwood, and manufacturers often use it for cabinetry, furniture, and flooring. As a result, oaks are highly profitable and often harvested. For example, the removal rate for oak in 1985 was 3.4 percent of inventory while the removal rate for all sawtimber was 2.4 percent of inventory (Competitive Challenge 34). Harvesting a disproportionate amount of oak-hickory, however, can lead to a shift in tree population. Maple-beech is the climax site for most areas and allows for plant succession to naturally lean toward maple-beech. Additionally, according to Forest Legacy, most oak-hickory stands contain species associated with the maple-beech type in some manner. Thus, when oaks

are harvested, the maple-beech component can be high enough to change the overall type of the stand. Furthermore, the expansion of maple-beech trees is naturally occurring because they are more shade tolerant than oak-hickory; thus, they can regenerate under a larger variety of conditions than oak-hickory stands are capable of.

Harvesting

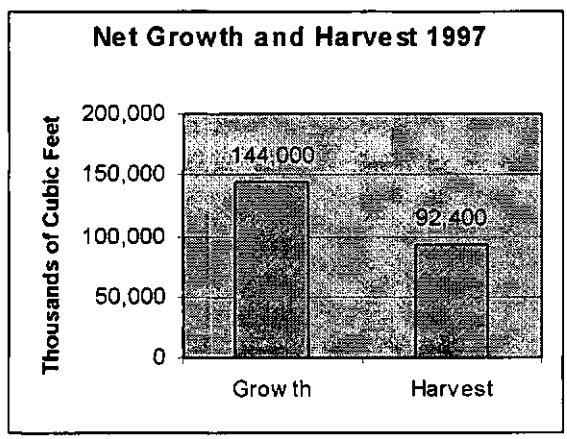
Most of Indiana's forestland growth will eventually face harvest: 75 percent of growth is harvested every year (Forest Legacy 7). The following graphs show the growth to harvest ratio for Indiana in 1985 and 1992:

FIGURE 5



Source: Evergreen, (1998), p.8.

FIGURE 6



Source: Wood Research Laboratory, www.fnr.purdue.edu.

To find the ratio of growth to harvest, foresters measure growth through a scientific procedure that takes into consideration the average age of trees in the forests and their growth rates; the number of trees cut down in a year calculates harvesting. Then, the two numbers are compared and provide a ratio. The charts show that the ratio of growth to harvest is relatively similar for both study years. In 1986, Indiana harvested 60.4 percent of growth; in 1997, 64.1 percent of growth was harvested. Although only a small difference exists, the numbers represent an alarming trend of a narrowing gap between the amount of growth and harvest. This is a "result of two converging trends increasing worldwide demand for fine

Indiana hardwood, and a decline in the rate of growth in forests, which is customary as trees age" (Evergreen 12). If this hypothesis is valid and Indiana continues to harvest large amounts of trees, harvest and growth will eventually equal each other.

Indiana should also be concerned with its low growth/removal ratio as compared to other Midwestern timber-producing states. The following chart gives the growth/removal ratio for six states:

TABLE 3

GROWTH-REMOVAL RATIOS FOR MIDWESTERN STATES

State	Year	Growth (Millions of Board Feet)	Removal (Millions of Board Feet)	Ratio (Growth/Removal)
Pennsylvania	1978	2008	718	2.8
Ohio	1979	1040	402	2.59
Kentucky	1987	1437	557	2.58
Michigan	1986	1690	836	2.02
Indiana	1985	687	461	1.49

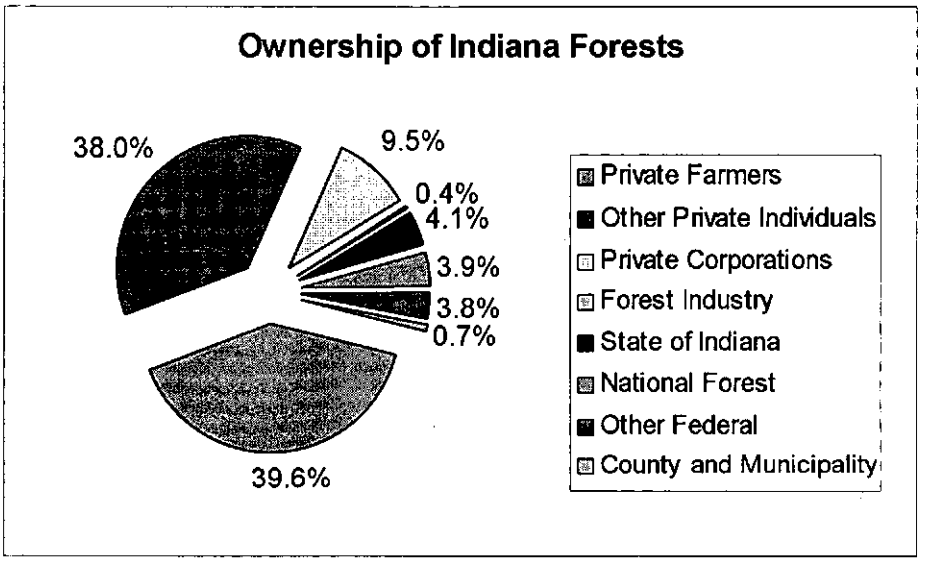
Source: The Competitive Challenge: Growing Indiana's Wood Products Manufacturing Industry, (1993), p.34.

Although the information reported is from different years and not directly comparable, it still strongly suggests that Indiana harvests more of its growth than other competing states. A possible reason for the poor ranking is Indiana grows less than many other states, an average of 1,011.2 fewer millions of board feet. To stay competitive, Indiana must harvest far more of its growth; it only harvests an average of 333.8 fewer millions of board feet. Ohio even harvests *less* than Indiana does. As a result, Indiana must cut down more trees to retain a stronghold in a competitive market.

WHO'S WHO IN INDIANA TIMBERING

Indiana's forestland is naturally divided among two groups: public and private. The following chart provides a breakdown of which groups own forestland and how much:

FIGURE 7



Source: The Competitive Challenge: Growing Indiana's Wood Products Manufacturing Industry, (1993), p.35.

The chart demonstrates the enormous impact that private owners have on timbering, for they own of 87.5 percent of Indiana's timberland. Because they control such a sizeable portion of the state's forestland, understanding how to promote healthy management of forests requires learning about who they are, the characteristics of the land, and why they purchase their land. Next, the report will examine how the State deals with its land, thus preparing the necessary background for what new initiatives the State might need to consider toward public land; after all, Indiana owns the second largest amount of forestland with 4.1 percent.

Nonindustrial Private Forest Owners

Before programs facing private forest owners can be implemented and evaluated, one must examine whom the nonindustrial private forest owners and corporations are. As the above chart describes, farmers own the largest percentage of forestland, followed by other private individuals. Private landowners purchase their land for numerous reasons. The following chart presents these motives for Indiana owners.

TABLE 4

MOTIVES FOR OWNING FORESTLAND

MOTIVE	PRIMARY		SECONDARY	
	# OF OWNERS	PERCENT	# OF OWNERS	PERCENT
Land Investment	2,200	1	13,800	9
Recreation	16,800	11	18,700	12
Timber Production	2,600	2	5,800	4
Farm and Domestic Use	23,500	16	11,700	8
Esthetic Enjoyment	25,600	17	6,600	4
Part of Farm	45,300	30	14,300	9
Part of Residence	15,300	10	10,200	7
Estate	16,900	11	11,900	8
Other	2,300	1	800	1
No Secondary Reason	N/A	N/A	56,700	37
No Answer	800	1	800	1

Source: Birch, Thomas. Private Forest-land Owners of the Northern United States, (1996), p. 219.

Naturally, all individuals do not purchase forestland for the same reason. Not surprisingly, the largest primary reason for purchasing forestland is it is part of a farm and the third highest is farm and domestic use; this is expected because farmers own the largest portion of private forestland. The second largest reason for purchasing forestland is esthetic enjoyment, which means this group is interested in protecting the forested environment. At the other end of the spectrum, only 2 percent of owners purchase their land primarily for timber production.

Although owners do not purchase their land with the primary of secondary intention of harvesting, great amounts of timber production occur. The following chart gives the primary motive for purchasing the land and then the amount of timbering that occurs on these acres.

TABLE 5

HARVESTING PATTERNS BASED ON MOTIVE

MOTIVE	HARVESTED		DID NOT HARVEST	
	# OF OWNERS	ACRES(1000S)	# OF OWNERS	ACRES(1000S)
Land Investment	13,800	309	3,600	116
Recreation	17,000	367	6,800	97
Timber Production	14,500	812	800	77
Farm and Domestic Use	17,200	387	9,700	116
Esthetic Enjoyment	20,200	657	33,000	425
Firewood	5,200	155	0	0
Other	1,500	97	1,600	77
No Answer	4,000	39	2,700	39
Total	93,400	2,823	58,000	947

Source: Birch, Thomas. Private Forest-land Owners of the NortherN United States, (1996), p. 220.

For all primary reasons, more acreage is harvested than not, although some individuals are more inclined to deforest their land based on their primary reason. Not surprisingly, the primary reason that produces the largest harvesting yield at 812 acres is timber production. Individuals who buy their land for this reason always will likely harvest at some point. Surprisingly, the second largest harvested acreage amount contains individuals concerned with esthetic enjoyment, although a large portion of the group also refuses to harvest and comprises nearly half of all acres not harvested at 425. While some individuals interested in esthetic enjoyment will occasionally selectively cut on their lands or be forced to financially, many individuals with this primary motive will continue to leave their trees alone. Farmers, who own the most private land, harvest the third most acreage. Their reasons for purchasing the land most often have little to do with interest in esthetics or recreation; it is part of their farm. As a result, they are not as concerned with protecting the forest's natural state like some other groups.

While understanding why individuals purchase land is essential, forming effective policy also involves knowing the average size of a forest parcel. The following chart provides a breakdown of the size of parcels for private individuals, corporations, and other private owners.

TABLE 6

SIZE OF FOREST PARCELS

SIZE	# OF OWNERS BY CLASSIFICATION		
	INDIVIDUAL	CORPORATION	OTHER
1-9	60,200	0	0
10-19	40,600	1,900	1,900
20-49	25,300	1,500	1,900
50-99	10,600	300	800
100-199	2,900	600	300
200-499	1,400	400	200
500-999	200	W	0
1000-4999	W	W	0
5000+	0	W	0

Source: Birch, Thomas. Private Forest-land Owners of the Northern United States, (1996), p. 212.

W – fewer than 50 owners

Of the 151,300 private forest owners in Indiana, more than one-third – 60,200 – own less than 10 acres. As the parcels grow in size, the number of owners decreases significantly. These numbers support the trend of more owners sharing less land. For example, in 1978, 48,100 owners owned 3.740 million acres of forestland. By 1993 – only 15 years later – the number of private forest owners rose to 151,300 acres, but the amount of private forestland increased by only 0.031 million acres to 3.771 million acres (Forest Legacy 4). Because of this trend, more owners own smaller parcels, as the graph suggests. A possible reason for this shift is many workers flock to the city for jobs, but they still desire a rural setting to raise their children; to live in a forested environment only requires owning a small parcel.

The size of the tract plays an interesting role in determining an owner's likelihood of harvest. The following chart displays harvesting patterns based on parcel size:

TABLE 7

HARVESTING PATTERNS BASED ON PARCEL SIZE

SIZE OF TRACT	1-10 YEARS		INDEFINITE		NEVER		NO ANSWER	
	# OF OWNERS	ACRES (1000s)	# OF OWNERS	ACRES (1000s)	# OF OWNERS	ACRES (1000s)	# OF OWNERS	ACRES (1000s)
1-9	15,700	58	14,700	77	29,800	135	0	0
10-19	20,200	271	9,900	116	13,000	155	1,400	19
20-49	15,200	445	8,800	251	2,900	77	1,800	58
50-99	5,300	329	3,100	213	2,800	174	600	39
100-199	2,400	290	900	135	600	77	0	0
200-499	1,300	367	600	135	100	19	0	0
500-999	100	97	100	39	0	0	0	0
1000-4999	100	97	0	0	0	0	0	0
5000+	W	97	0	0	0	0	0	0
TOTAL	**60,300**	**2,051**	**38,100**	**966**	**49,200**	**637**	**3,800**	**116**

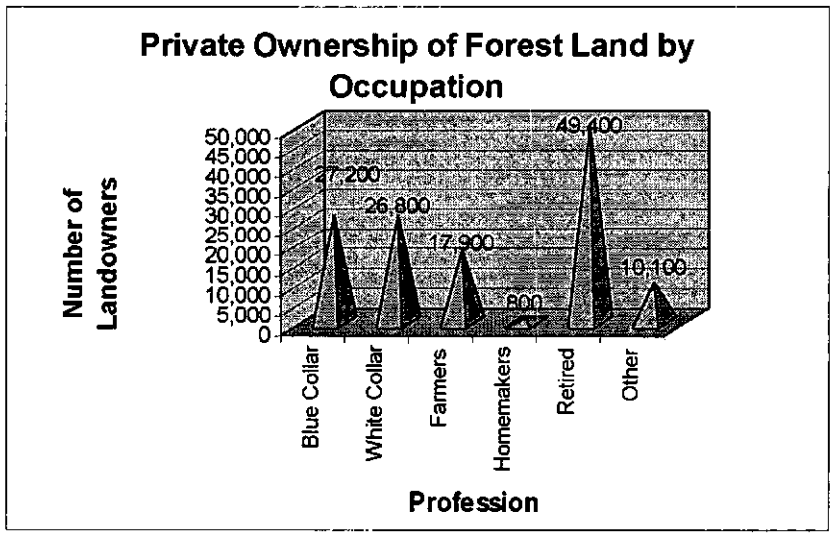
Source: Birch, Thomas. Private Forest-land Owners of the Northern United States, (1996), p. 221.

As the amount of owners has increased, smaller parcels have also occurred, and the chart demonstrates how smaller parcels significantly decrease the chance of harvesting. Of those owners with parcel sizes less than 10 acres, only 600 more owners plan to harvest than never harvest. A possible reason for this is smaller land owners often buy their land for non-monetary reasons because small parcels cannot turn a large profit; thus, owners who purchase land for this reason are less likely to harvest their forests.

As parcel size increases, however, the amount of harvesting owners increases significantly. For example, for parcels under 20 acres – only twice as many acres as the previous sample – 17,100 more owners will harvest than not. The proportion of harvesting owners continues to grow so dramatically that once the parcel size reaches 500 acres, owners will always harvest their land. Owners who purchase these large tracts are most likely interested in monetary benefits, for large parcels can turn a high profit. Furthermore, much of this land is most likely part of a farm – for more forest acreage is owned by farmers than other private individuals – or belongs to other owners who have purchased the land for some other reason than enjoyment and are more interested in harvesting.

Another important distinction to make between private forestland owners is their social classes. The provision of such material helps to determine the amount of education and average household income for private forest owners. The following chart shows the professions of private forest owners.

FIGURE 8



Source: Birch, Thomas. Private Forest-land Owners of the Northern United States, (1996), p. 215.

Retired individuals compose nearly half of all private forest owners, owning 49,400 parcels. Additionally, blue-collar and white-collar workers own approximately the same amount of parcels, suggesting that higher income and education does not necessarily lead a person to desire owning forested acreage more. Interestingly, although farmers own more *acreage* than any other group, they only own 17,900 parcels. This insinuates that they own the larger-sized parcels of forestland, as suggested in the above section. Understanding ownership class is extremely important because various groups think differently. Thus, once policymakers identify a large group of owners, they can concentrate on discovering the greatest common needs among them.

Occupation class can also play a crucial role in distinguishing what type of person is most likely to deforest their land. The following chart demonstrates how likely each occupation is to harvest:

TABLE 8

HARVESTING PATTERNS BASED ON OCCUPATION

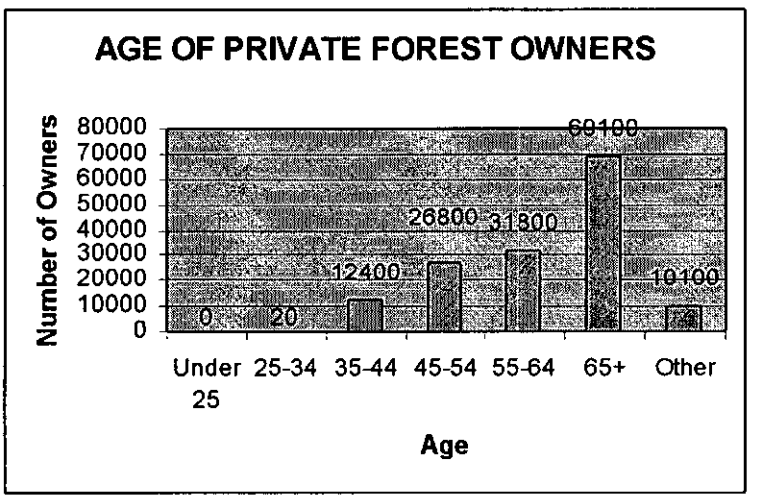
OCCUPATION	1-10 YEARS		INDEFINITE		NEVER		NO ANSWER	
	# OF OWNERS	ACRES (1000s)	# OF OWNERS	ACRES (1000s)	# OF OWNERS	ACRES (1000s)	# OF OWNERS	ACRES (1000s)
Professional	4,200	193	8,300	77	500	6	600	19
Managers	1,100	97	1,300	77	7,200	9	0	0
Other White Collar	2,300	39	900	39	500	3	0	0
All White Collar	**7,500**	**329**	**10,500**	**193**	**8,300**	**18**	**600**	**19**
Craftsman	700	19	1,000	19	0	0	0	0
Blue Collar	10,200	174	1,900	58	13,500	15	0	0
All Blue Collar	**10,900**	**193**	**2,800**	**77**	**13,500**	**15**	**0**	**0**
Farmers	10,400	406	2,300	116	5,100	12	0	0
Homemakers	0	0	100	19	0	0	600	19
Retired	14,500	541	14,000	367	19,000	39	1,900	58
No Answer	11,600	97	5,800	58	1,200	6	600	19
All Other Owners	5,300	483	2,500	135	2,300	9	0	0
Total	**60,300**	**2,050**	**38,100**	**967**	**49,200**	**638**	**3,800**	**116**

Source: Birch, Thomas. Private Forest-land Owners of the Northern United States, (1996), p. 215.

Retired individuals currently own the most parcels, and while many retired individuals do not want to harvest their land, they only control 4.1 percent of the acreage that retired individuals own. The retired owners interested in harvesting might be looking greatly at financial considerations, for incoming funds can be small for many over the age of 65. Overall, blue-collar workers are less likely to harvest land than white-collar workers are, although both groups have many members not interested in ever harvesting. As mentioned above in the description of the increase in small parcels, a possible reason for this trend is that many of these individuals – despite occupation – work in the city but want to live in the country. Thus, many white-collar and blue-collar workers wish to keep the forest setting and not harvest. Those who harvest most likely have larger parcels: Harvesting white-collar workers own an average of 26.84 more acres than those who leave their land alone and harvesting blue-collar workers own 49.8 more acres than blue-collar workers who do not deforest. Thus, education level overall does not appear to play as large of a role as parcel size. Finally, this breakdown also supports the claim that farmers are highly likely to harvest for reasons mentioned above, for only 12,000 acres of forestland owned by farmers will not be harvested.

While occupation provides information on what each owner does, age must also be examined to better decipher the individual characteristics of owners. The next graph provides how old private forest owners are:

FIGURE 9



Source: Birch, Thomas. Private Forest-land Owners of the Northern United States, (1996), p. 216.

As the analysis of occupation shows, owners older than 65 make up the majority. Yet, the older trend can also be observed by looking at the breakdown of the other age brackets. Only approximately 20 people under the age of 35 own forestland in Indiana, and as the age increases, the proportion of owners also grows larger. This trend can likely be connected to the patterns of parcel size and white-collar and blue-collar workers; when individuals are younger, they live in the city and experience the urban lifestyle; when it is time to raise a family, however, they prefer the country environment.

As the number of owners increases simultaneously with age, the same pattern occurs with harvesting patterns, as the following chart demonstrates:

TABLE 9

HARVESTING PATTERNS BY AGE

AGE	HARVESTED		DID NOT HARVEST	
	# OF OWNERS	ACRES(1000S)	# OF OWNERS	ACRES(1000S)
Under 25	0	0	0	0
25-34	W	19	0	0
35-44	10,200	155	2,200	77
45-54	10,800	348	16,000	155
55-64	22,300	483	9,500	155
65+	44,300	1,257	24,800	425
No Answer	1,100	19	0	0
Other Owners	4,600	541	5,500	135
Total	93,300	2,823	58,000	947

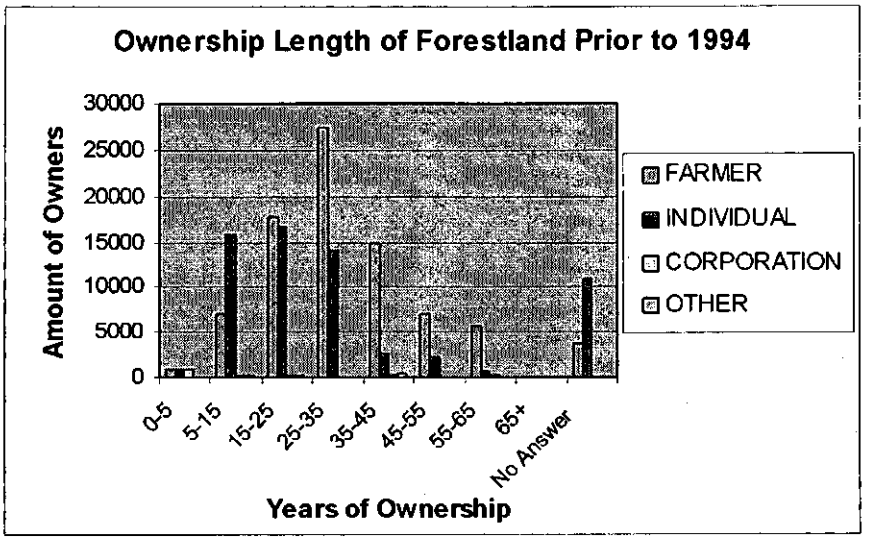
Source: Birch, Thomas. Private Forest-land Owners of the NortherN United States, (1996), p. 219.

W – Fewer than 50

The proportion of acres harvested to those left alone increases with age. For example, owners between 35 and 44 harvest 66.8 percent of their land. Retired individuals, however, harvest 74.7 percent of their land. A possible reason for this differentiation is younger owners have not lived on the land for as long; as a result, they know less about forest issues and management practices and might prefer simply to leave the land alone because of their lack of knowledge.

Finally, the length of ownership for private owners is extremely beneficial. According to the Department of Natural Resources, an individual owns forestland for an average of 12 years (Fischer 3). These numbers are especially important for developing management practices because when one owner does not control the land for a significant period of time, a lack of management continuity will most likely occur and have detrimental effects on the land. The following chart of ownership length by ownership class mostly supports this view.

FIGURE 10



Source: Birch, Thomas. Private Forest-land Owners of the Northern United States, (1996), p. 219.

Private individuals other than farmers are most likely to own land for less time, usually between 5 and 35 years. After that length of time, their ownership numbers decrease dramatically. Farmers, on the other hand, have a strong presence through 65 years of ownership. This most likely results from forests being attached to farmland; because they earn their living from the land, they are much more likely to maintain ownership throughout the years and perhaps use it for farm and domestic use (see primary and secondary reasons above). Finally, corporations have only now begun to make an impact, owning most of their parcels less than 5 years. However, no harvest information is available at this time concerning the relationship between harvesting and years of ownership.

The above analysis produces prototypical profiles for individuals likely to harvest or not harvest:

TABLE 10

PROTOTYPICAL PROFILES

FACTOR	MOST LIKELY TO HARVEST	MOST UNLIKELY TO HARVEST
Reason for Purchasing Land	Firewood, Timber, Farm Use	Esthetic
Parcel Size	Larger Parcels	Smaller Parcels
Occupation	Retirees, Farmers	White Collar, Blue Collar
Age	Older	Younger

While these prototypes do not apply to all members who fit into these categories, they are the most likely to encourage or discourage harvesting. Such information can help policymakers distinguish who their target groups are.

While this analysis applies to all of Indiana, it can also be observed on a smaller scale in Monroe County, which has approximately half of its 260,000 acres in forestland (Koontz 6). According to a study performed by Tomas Koontz, private forest owners in Monroe County are likely to have many of the same characteristics as other Hoosiers when deciding whether to pursue a land use based on financial reasons (timbering/development) or non-monetary reasons (active protection/mowing). He compiled two prototypical profiles for Monroe County:

TABLE 11

MONROE COUNTY PROTOTYPES

FACTOR	FINANCIAL CONCERNS (TIMBERING)	NON-MONETARY CONCERNS (NO TIMBERING)
Parcel Size	Larger	Smaller
Age	Older	Younger
Education	Lower	Higher
Income	Lower	Higher

Koontz, Tomas. Explaining Private Land Use Decisions and Outcomes in a Midwest County: A Micro-Level Approach, (April 1999), p.20.

For Koontz' study, individuals with non-monetary concerns are the least likely to harvest their land. Koontz recognized the same trends concerning parcel size and age as those established by the above analysis: Younger owners with smaller parcels are less likely to harvest. According to Koontz' study, owners with higher levels of education and income are also more likely to leave their forested acreage alone. Although a direct correlation between this aspect of Koontz' study and the above analysis cannot be made, a slight relationship does exist between blue-collar and white-collar workers. Overall, blue-collar workers have less education than white-collar workers have, and according to Koontz, these individuals are more concerned with monetary issues and thus have a greater interest in harvesting. However, the opposite occurs on a statewide basis: *white*-collar workers are more likely to harvest than

blue-collar workers; only 31.6 percent of white-collar workers will not harvest on their land as compared to 49.6 percent of blue-collar workers.

State Of Indiana

The state owns approximately 4 percent of all of Indiana's farmland. While this number is small in comparison to private forest owners, the state still has an important role in both the public and private sector. Indiana owns thirteen state forests; the following chart provides the name, acreage, and founding date for the lands:

TABLE 12

INDIANA STATE FORESTS

NAME	ACREAGE	ORIGINAL PURCHASE DATE
Clark	23,979	1903
Deam-Lake	1,300	1965
Ferdinand	10,571	1933
Greene-Sullivan	8,000	1936
Harrison-Crawford	26,000	1932
Jackson-Washington	16,500	1930s
Martin	7,023	1932
Morgan-Monroe	24,000	1929
Owen-Putnam	6,245	1948
Salamonie River	850	Mid-1930s
Selmier	355	1934
Starve Hollow	500	1938
Yellowwood	23,326	1956

Source: Indiana Division of Forestry Web Site, http://www.state.in.us/dnr/forestry/index.html.

For the most part, the state forests were purchased in the first half of the century, when the conservation movement first began and had the strongest support: The state has not created a forest since Deam-Lake in 1965, although small parcels of land have been added to various forests.

The Department of Natural Resources' Division of Forestry manages the above lands in accordance with its mission statement: The Division "promotes and practices good stewardship of natural, recreational, and cultural resources on Indiana's public and private forest lands. This stewardship

produces continuing benefits, both tangible and intangible, for present and future generations" (Fischer 1). The mission of the department has changed little much throughout the years; thus, the policies employed at the turn of the century are often still upheld today. According to State Forester Bernard Fischer, "We believe [the mission] will be as true in the future as it was to Charles Deam 75 years ago" (Fischer 5). While adhering to the same mission for 75 years is important to maintaining continuity of action, this view can easily meet with criticism. While it is important for forests to have a continuous form of management that promotes similar goals, the needs of the State Forests will likely change over the years. The Division of Forestry must be ready to change its mission according to this, and at this time, it is not prepared to make significant changes if necessary because of its unfaltering commitment to an old mission.

While the mission toward state forests have not changed since the creation of state forests in the early 20th Century, neither has the Division's policy toward harvesting timber on state land. Every tract on state land is managed on a 30-year cycle. Every 30 years, a forester visits the tract and marks the trees ready for harvest. In fiscal year 1997-98, an estimated volume of 2,653,053 board feet in 13,617 trees was sold from eight state forest harvests. In comparison, an estimated volume of 15 million feet was grown on state forestland during the same year. The following chart provides a breakdown of harvesting in the state forests:

TABLE 13

FOREST	TREES CUT	BOARD FEET
Clark	1,322	221,015
Ferdinand	2,198	345,138
Harrison-Crawford	2,749	459,062
Jackson-Washington	947	112,712
Martin	1,150	209,315
Owen-Putnam	722	165,190
Yellowwood/Morgan-Monroe	4,529	1,187,236

Source: Fischer, Burnell, Written Correspondence, (29 March 1999).

During the 1997-98 fiscal year, the Division of Forestry cut trees in only eight state forests. With the exception of the Greene-Sullivan State Forest, the other forests were not harvested mostly because of their small acreage (see above chart) and/or recent acquisition date (Deam-Lake); thus, "these forests are not ready for harvest" (Carlson). Greene-Sullivan State Forest has a unique reason for escaping harvest in the 1997-98 fiscal year: Most of the property was strip-mined in the early and mid-1900s and thus is not ready for harvest. However, Steve Siscoe, property manager for the state forest, believes Greene-Sullivan will eventually harvest. He says, "As trees mature, I anticipate that we will conduct a few harvest operations. We have some nice plantations of black walnut and white oak, but they are several years away from being merchantable."

While Indiana harvests a tremendous amount of trees during a year on state lands, it still harvests well below the state average. In state forests, 17.8 percent of a year's total growth is harvested; once private forests are included in the total growth and harvest, the total growth harvested is 61.6 percent. Thus, the state has made an effort not to harvest as much as private owners do, which most likely results from the state's superior knowledge of appropriate harvesting and replanting techniques; many private land owners are not familiar with these practices.

According to a statement released by Burnell C. Fischer, the state's policy toward timber harvesting will not likely change in the future but will adhere to the following guidelines. "The goal is to maintain a timber harvesting program within the resource management program of the state forest system that:

- Provides demonstration of good forest stewardship;
- Provides a reliable revenue source to help meet the DNR goal of less reliance on General Fund monies;
- Remains compatible with the Division's mission to provide multiple forest uses."

The state achieves its goals for the most part, for it provides a good example of appropriate forest stewardship by harvesting much less than the state average and simultaneously secures funds. However, the state – like most private owners – continues to harvest the state's most precious hardwoods, such as oak-hickory. It provides another good example of forest stewardship through the major distinction exists between its policy toward timbering and many private forest owners: "Many timber cuts on public lands are justified by trying to encourage oak regeneration, thus maintaining the 'correct amount' of oak component in the forest" (Carlson). As a result, most of the maple-beech recolonization mentioned above must occur on private forestland and not state property. Thus, the Division of Forestry achieves its three goals in an overall effective manner; however, debate exists whether these goals are proper and if nature's forested areas should be left alone from human intervention. (Numerous interest groups tackle this issue, and their opinions are discussed in detail in a further report.)

The state is currently in a precarious position regarding timbering. Harvesting timberland plays an important role in Indiana's economy, but environmental issues must also be taken into consideration. The timber resources are declining in quality. Additionally, profiles of private forest owners – who control approximately 87 percent of the state's forests – show that more forested acreage will eventually be harvested than left alone, and the state plans to continue current harvesting practices. Thus, policymakers must use this information to form effective programs that target groups most likely to harvest and find a middle ground that can protect both the environment and the economy. If this does not occur, the state could easily find itself unable to compete in the timber market or protect the forested environment so many people and animals rely on.

WORKS CITED

Birch, Thomas. Private Forest-Land Owners of the Northern United States, 1994. USDA Forest Service: Radnor, PA, 1996.

Carlson, Laura. E-mail Correspondence. 19 April 1999.

The Competitive Challenge: Growing Indiana's Wood Products Manufacturing Industry. Department of Natural Resources: Indianapolis, 1993.

Evergreen: The Magazine of the Evergreen Foundation. Jan. 1998 edition. Vol. 9, No. 18.

Fischer, Burnell. "Indiana Division of Forestry Response to Questions from Laura Carlson. Indiana Forest Alliance." 25 March 1997.

Fischer, Burnell. Written Correspondence. 29 March 1999.

"Forest Health Highlights Indiana: 1997." www.willow.ncfes.umn.edu/states/fact_in.htm. 22 March 1999.

Hackett, Ronald L. And Robert W. Mayer. Indiana Timber Industry – An Assessment of Timber Output and Use. USDA Forest Service: St. Paul, MN, 1993.

Indiana Division of Forestry Web Site. http://www.state.in.us/dnr/forestry/index.htm

Indiana Forest Legacy Program Assessment of Need. Department of Natural Resources: Indianapolis, 1998.

Koontz, Tomas. Explaining Private Land Use Decisions and Outcomes in a Midwest County: A Micro-Level Approach. Presented at the Western Social Science Association Annual Meeting. April 1999.

Siscoe, Steve. E-mail Correspondence. 24 April 1999.

Spencer J. and N. Kingsly and R. Mayer. Indiana's Timber Resource: An Analysis. US Department of Agriculture: Washington D.C., 1990.

"Wood Research Laboratory: Industry Information." www.fnr.purdue.edu. 5 August 1998.

Section 2

Public Land After A Harvest

Aaron Feyos

Woodland Goals

Forests are an ideal investment because they are a renewable resource that provides timber, wildlife, clean air and water, and recreation and the most productive and enjoyable forests are the ones that are healthy and vigorous. Therefore, any mistake in forest management may result in many decades of recovery. By using forest improvement methods, a forest will be able to meet most land use objectives while providing necessary growing space for high quality trees and creating an environment for the natural reseeding of the forest. The main objectives involving woodland improvement are protection, wildlife, and timber protection (Forest Improvement Handbook 3).

The most important improvement goal is protection. For forest improvement to be successful, the woods must be protected from human destruction, livestock grazing, and in certain areas fires. Human destruction involves various aspects of interference into the forests whether it includes cutting down trees or simple activities like hiking. The grazing of livestock can also be detrimental to woodlands. Grazing reduces soil quality because livestock compacts the soil on the forest floor. Through the process of compacting, feeder root are prevented from getting necessary air supplies through the soil and allows organic mulch to be washed away by water before the nutrients can be absorbed (Forests and Our Environment 3).

The second goal for woodland improvement is wildlife. Woodland openings for natural reseeding can attract wildlife such as deer and songbirds that thrive where open areas and woodlands meet. The thinning of trees in forests eliminates nesting cavities for woodpeckers, owls, squirrels and other wildlife species. Forest improvement methods help create these wildlife habitats. Healthy and productive woodlands also provide

valuable intrinsic qualities for the forest visitors. Activities like birdwatching, hiking, and hunting are just a few recreational opportunities are available in a hearty forest.

When efforts are made to improve a forest, time between timber harvests is reduced, growth rates of trees increase, and the species composition of the forest can be improved to include a variety of different species. In northern Indiana, the soil is capable of sustaining forest sites nearly anywhere. In southern Indiana, areas protected from direct sunlight and wind contain more moisture and nutrients for tree growth (Tree Planting Instructions 4-6). Through good forest management, vines and low quality trees are eliminated to give trees ample growing space. Forest improvement increases the quality of remaining timber and encourages a much more expedient regeneration process in open areas.

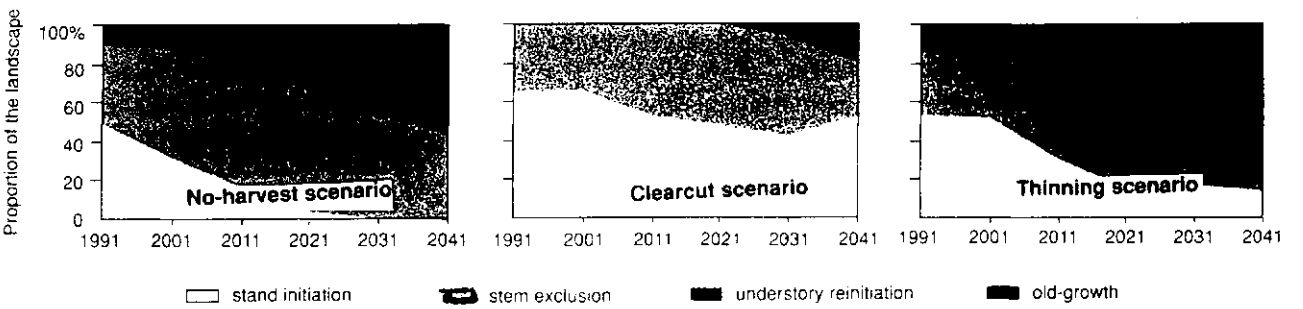
Although Indiana has numerous programs for forest improvement, the forests are not reproducing in the same quantities that are being cut down. The main reason for this decline could be directly correlated to industrialization and development. The local governments need to set aside specific areas as land that cannot be developed or else the forests will continue to be depleted.

Improvement Methods

A common practice that promotes improvement of forests on state-owned land is crop tree release. This practice involves removing adjacent, dead, diseased, or just less desirable trees. In releasing a crop tree, any vine that is competing with the crop trees' crown for sunlight should be eliminated (Woodland Management1-3). This will allow the tree to develop a full, vigorous crown necessary for maximum growth. Grapevines often grow through and over the tops of trees, thus killing or deforming trees. It is desirable to

kill or deaden all wild grapevines in areas where many vigorously growing trees exist. If the forest floor is heavily shaded, grapevines need to be cut off at any convenient height. However, if the sun shines on the forest floor most of the day, then grapevines and vine loops should be treated near the soil with appropriate herbicides (Woodland Management 1-3). Vines do not have to be completely eliminated from a forest. In the case of vine tangles or concentrations, control of the tangle itself is not physically feasible due to the large number of vines and the presence of thousands of grape seeds in the soil. Control of the vines up to the area of the tangle is usually possible (Forest Management Concepts 2).

Cull tree removal is another forest improvement technique. A "cull tree' has no real value other than providing food for some wildlife or serving as a nesting site. However, the goal of all forests is to maintain "wolf trees." A "wolf tree" is different from a cull tree because it has a large crown and short trunk and probably developed when it had little or no competition from other tree crowns while it matured (Talking About Trees 5). The removal of "cull trees" is a very difficult process and in some areas a very tedious task. However, the removal of this type of tree provides areas of land for healthy, desirable species (Talking About Trees 6). Figures 1.1 and 1.2 provide a visual expression of forests stand in three different scenarios. The graphs depict the type of timber produced and the amount of old growth as a result. Fig. 1.1 and 1.2



Source: Indiana Dept. of Natural Resources. Talking About Trees, p. 7

Landscape Management System

The landscape management system is used for evaluating management alternatives by integrating the large amounts of information necessary for designing complex landscape plans (The LMS is a computer program that is based on Microsoft Windows applications to help foresters organize and plan land management.) and requires knowledge and information at the stand scale to project changes in landscape-scale processes (Cutting Edge Tech. 12). Landscapes in LMS are organized as portfolios containing forest stand inventory data, growth models, stand boundaries, and elevation. This system also allows land managers to compare and contrast forest structure during a given period or time. The following graph provides a detailed explanation of how the LMS system operates.

Fig. 2.1

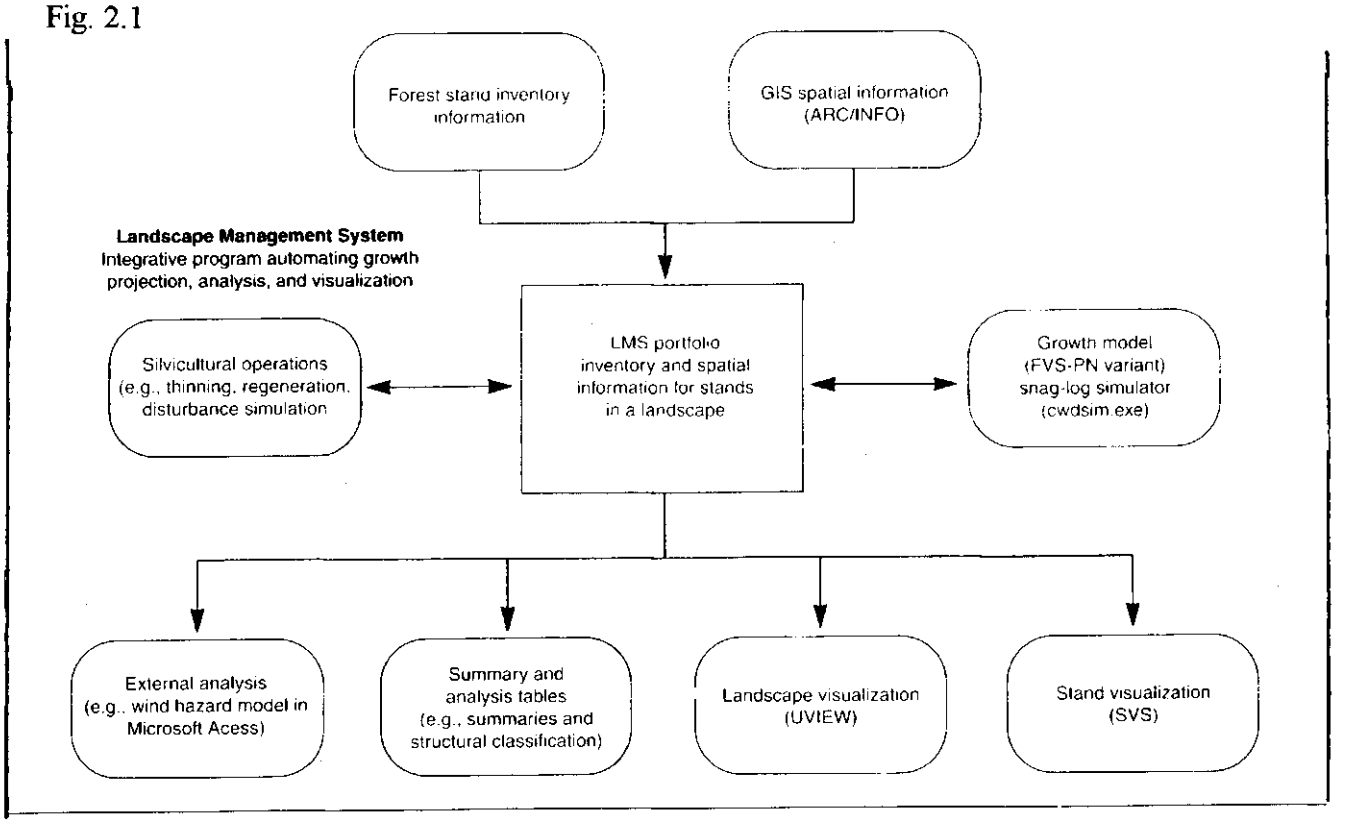


Figure 1. **The flow of information into and through the Landscape Management System. Each connecting line represents one or more filter programs that format information being transferred according to the client's requirements. The shaded area identifies the core components of LMS.**

Source: Journal of Forestry. Vol. 96 #6 p. 45

This program drastically reduces the time state, local, district, and private foresters must use to analyze each area of land. Although this technology is beneficial and reduces time, foresters should still test the results of the program on site to see if the programs' conclusions and assessments are correct.

Special cutting and chemical additives for forest promotion

Cutting large wolf trees or cull trees is rarely feasible because it often results in damage to nearby trees. Special techniques should instead be applied to these trees. It is also a good practice to kill the stumps of smaller trees by chemical means to prevent sprouting, the process of a new tree growing out of the stump of a previous tree. Small stumps of desirable, healthy species should be cut as low to the ground and left untreated because sprouts from these stumps may become an enormous 'wolf tree' (Forest Improvement Handbook 3-4). Figure 3.1

A). Axe Girdle B). Frilling C). Basal Spraying

Source: Indiana Dept. of Natural Resources. Forest Improvement Handbook p.7

Girdling is the process of removing a section of bark and cambium layer all around the tree with either an ax or chainsaw. This technique allows the tree to deteriorate and gradually die, which does very little damage to surrounding trees (Forest Improvement Handbook 4). The best time to girdle is in late summer or early fall, but it can be done during other seasons. By applying an appropriate herbicide into areas of the girdle will ensure an effective kill. A forester usually decides to girdle a tree to ensure that a nearby tree can flourish without any competition from the girdled tree. The only disadvantage of this technique is an unwanted sprout may occur. See figure 3.1 A

Frilling is another technique a forester can suggest to ensure a lack of competition for more hearty species. This method is the most successful technique to kill trees over 4" in diameter (Forest Improvement Handbook 5). A frill girdle is created by cutting around the trunk of a tree with an ax at a downward angle and thus creating a "frilly" appearance. Frilling forms pockets where a herbicide can easily be applied. If the tree has wounds or seams involving the bark, the frills should be made above the defect. Appropriate herbicide should be applied to the freshly cut frills until all surfaces are moistened. See figure 3.1 B

Basal spraying is another technique that can effectively kill trees with a diameter of less than 4". The appropriate herbicide for this use should be applied directly to the base of the trunk and the ground should be saturated approximately 2"from the ground (Forest Improvement Handbook 6). Re-spraying may be necessary to complete the kill in the case of select hard to kill species. See figure 3.1C

Each of these forestry techniques are very beneficial for the maintenance of the forests. However, the problem that often arises with these techniques is no one checks to see if the tree's problem is corrected. District foresters are often busy and do not always have the time to double check the tree-removal technique. The final problem with these

cutting practices is that they do not always work. Many of these techniques have the same fault: sprouting occurs or the tree does not die.

After a Harvest

Figure 4.1

Source: Dept. of Natural Resources. After a Harvest p. 3

There are several important techniques to follow after a tree has been harvested. The following objectives should be met to ensure quality of the rest of the forest, for it is extremely important to improve and complete the openings created by the harvest (After a Harvest 2). This will encourage and promote the sprouting and growth of future trees needing extensive sunlight for maturing. Competing trees are another important issue that should be addressed after a harvest. It is essential to remove all invaluable trees the could make new trees vulnerable for space, water, and sunlight. Through the removal of these trees, remaining trees will be able to grow at an accelerated rate under less competitive conditions (After a Harvest 3). As previously discussed, grapevines can be detrimental to trees because they greatly restrict the growth of trees or even kill them. Some vines can be left along the woods edge or other locations to provide a food source and habitat for wildlife. The most important factor to address is soil erosion. The elimination of soil

erosion can be prevented, but is usually due to roads that are created when trees are drug out of the forest (After a Harvest 5). (This problem can easily be stabilized by smoothing and proper placement of water diversions.) Seeding and mulching may be necessary on steep slopes and exposed road sections. Forests of Indiana can regenerate very rapidly on their own, if proper forestry techniques are followed. (Any questions regarding the removal of trees from state property is performed by various sections of the Department of Forestry.)

After a harvest, trees that are removed from state property are generally done so for a particular reason. Although trees are removed for a definitive purpose, they are often not replanted as quickly as needed. Therefore, many trees are removed for the benefit of particular trees, but the overall number of trees is reduced.

Grant Programs

Figure 5.1

Program Title	Funding Source	Eligible Applicants	Grant Amount	Match	Deadline to Apply	Projects Begin/End
Urban Forest Conservation Grants	U.S. Forest Service	Municipalities or not-for-profits	$2,000 to $20,000	Equal match	Jan. 15, 1998	Sept 99
Arbor Day Grants	U.S. Forest Service	Municipalities or not-for-profits	$500 to $1,000	Equal match	Jan.	
Hometown Indiana	State of Indiana	Municipalities or not-for-profits	$2,500 to $20,000	Equal match	May 1, 1998	Aug.98 June 2000

Source: Indiana Dept. of Natural Resources. Forestry Homepage

There are four major grants the provide assistance to Indiana forests: the Urban Forestry Conservation Fund Grant, the Hometown Indiana Grant, Arbor Day Grant Program, and the Tree Stewards Grant. The Indiana Division of Forestry administers

three grant programs that are intended to help improve, protect, maintain, and increase the number of urban trees and forests in Indiana communities. Federal and state grants are provided on an annual basis and varies between years. See Figure 3.1 for a detailed outline of each grant and the amounts available to applicants.

The Urban Forest Conservation Fund Grants are intended to develop long term management programs for urban forests. Recipients of this grant are able to use the funding for any project that benefits the improvement or protection of urban trees. Projects ranging from developing tree maintenance, writing tree ordinances, or the purchasing of educational materials have been accomplished from this grant. Cities may spend up to 20 percent of this grant for demonstrating tree planting projects (Grant Programs 4). Other organizations like not for profit organizations are eligible to apply for this grant with the stipulation that they match the grant with the same monetary amount.

Arbor Day Grants can be used to fund any type of activity which helps promote Arbor Day and the planting and care of urban trees (Grant Programs 5-6). Arbor Day activities have included celebrations and events, educational workshops, public awareness campaigns, and distribution of materials. Federal assistance provided $183,000 to fund Arbor Day projects and to develop community forestry programs. Any municipalities and non-profit organizations are eligible to apply for $500 or $1,000 grants (Grant Programs 5-6). See figure 6.2

Federal Program Support *Dollars in thousands*

The State Program	FY 1995	FY 1996	FY 1997	FY 1998
	272.1	299.3	275.2	261.3

Source: Indiana Dept. of Natural Resources. Forestry Homepage

Another program in the state of Indiana is the Hometown Indiana Grant. This program was passed in 1998 to provide funding for urban forestry, park development and historic preservation (Grant Programs 6). Hometown Indiana Grants for community projects may be used to share the cost of tree planting and other urban forestry projects. In 1998, this program awarded $381,230 in state funding to 31 Hometown Indiana Grantees for tree planting projects and program development activities (Forest Highlights).

Through analyzing the state grant programs, there is an obvious flaw with particular parts of various programs. The major problem is that many of these grants are on a matching basis. A matching basis means that the government will match the same amount that the applicant for the grant requests. The problem is that many smaller groups do not have the necessary monetary collateral to match the funds and can not benefit from them. Another troubled area with these grants is that they are available to the private and to the public. With the competition from the grants, some interest groups may not get the money they need to perform the tasks they wish to achieve.

State Nurseries

The Indiana Department of Forestry operates two state owned nurseries, which produce tree and shrub seedlings for Indiana lands. These trees are also available for private land owners as well. Indiana operates two tree nurseries named the Jasper-Pulaski and Vallonia (State Nurseries 1-3). Any Indiana landowners are able to order trees at state discounted prices. The price of trees is kept low in order to encourage conservation plantings. Conservation seedlings are produced from seed collected in the wild and are

not generally suited for shade or ornamental uses. The types of trees available from these nurseries can be divided into three major categories: pines, shrub seedlings, and windbreak conifers. Each section of trees usually has a specific purpose and can only be planted in certain areas. Seedlings usually are 5 to ten inches tall, and are bundled into bales of 100 seedlings each (State Nurseries 1-3). Tree planting and the actual production of conservation seedlings is one of Indiana's oldest and one of the most successful programs. Tree plantings assure protection of our states soil and water, cover and food for wildlife, and other valued conservation benefits. The nurseries mission statement is to grow and distribute high quality plants materials for conservation plantings. Conservation plantings include planting for timber, windbreaks, wildlife food and habitat, watershed and soil protection, reclamation and education. These nurseries strive to produce and distribute the highest quality stock that their knowledge and resources permit (State Nurseries 4).

The State of Indiana has only two state nurseries to furnish the entire state with seedlings. The problem with the state nurseries is that trees are on a first come first serve basis. Due to the first come first serve basis, many people do not get the species of trees that they wish to order. Therefore, citizens choose other species instead. Finally, people get tired of not getting the type of trees they wish and go elsewhere or merely do not buy trees. Indiana has a problem with the lack of producing enough trees and possibly should consider developing another nursery.

Tree Spacing

Figure 7.1

Suggested spacing	# of trees per acre	Remarks
6' x 6'	1,210	Erosion control and Christmas trees
8' x 8'	680	Best for general reforestation
10' x 10'	435	On better sites where trees are to be cultivated with mechanical equipment
12' x 12'	300	Best for windbreaks
16' x 16'	170	Best for windbreaks

Source: Indiana Dept. of Forestry. Tree Planting Instructions, p.4

Tree spacing is an intrical part of providing a healthy environment for tree growth. Tree spacing varies depending on the objectives of the planting and the species planted. Open field plantings for timber should have spacing between 6 and 10 feet between them (State and Private 2). This spacing will result in a higher probability of tree success. (See figure 4.1) In addition to tree spacing, site preparation place a critical role for the tree spacing. To grow and survive, tree seedlings must compete for limited soil nutrients,

moisture, and sunlight. The amount of site preparation needed depends on the amount of weed competition. Remove all perennial weed competition the summer or fall before planting. This can be accomplished either mechanically or chemically. A band treatment is recommended on sloping or highly erodible land (Public and Private 3). Discing, plowing, and the elimination of perennial weed competition, releases nutrients stored in organic matter. These nutrients and increased soil moisture enhances seedling survival and growth during the first growing season.

Wind Hazard Model

The wind hazard model is a simple model for combining site and stand hazard ratings into an overall wind hazard rating. Site hazards , index rooting depth, soil moisture, topographic exposure, and other environmental conditions that are not generally altered by forest management (Wind Hazard 54). Stand characteristics, such as tree height and diameter, crown size, species, trees per area, and the condition of neighboring upwind stands, are determined by the individual trees in the stands and how the landscape adapts changes. Matrices for soil, exposure, and stand rankings are combined into an overall wing hazard value (Wind Hazard 55). As shown in the figure (6.1) below, exposure is a measure of a stand's topographic position relative to upwind stands (wind direction is variable in the model). Soil describes the effect of a stand's soil attributes on windthrow potential. Soil receive a severe, medium, or low ranking based on their maximum rooting depth and soil drainage rates. Stand refers tot he conditions of trees in stand and relative conditions of upwind neighboring trees, Stand factors and their weighting have been developed from a review of wind hazards.

Figure 8.1

Source: Journal of Forestry Vol. 96 #6 p. 47.

Foresters use these charts as information when deciding how to manage and maintain forest quality. The wind hazard model allows managers to determine the needs and accommodations for healthy and vigorous tree species.

Timber Marking

Timber marking is a service that is provided by the district forester. Marking eliminates possible misunderstanding as to which trees are to cut or eliminated (Timber Marking 5). This procedure allows additional growing space for nearby trees of higher quality. However, the main goal of marking is to improve growing conditions that concentrate on the highest quality trees. Marking is most often done where trees are mature, overmature, or where the tree is an inferior species. Since most high-value hardwood species require full sunlight to become established, the old stand is marked so small patches will be cleared. This method, also known as "group selection," creates favorable conditions (Timber Marking 4-6). Removing trees is the major tool by which a

forest is managed, but it must be controlled to be effective. Controlled cutting is best accomplished by marking the trees to be cut.

Bibliography

1). USDA Forest Service, Northeastern Area. State and Private Forestry Planting of Hardwood Seedlings FNR-134.

2). Cooperative Extension work in Agriculture, State of Indiana, Purdue University. Forests and Our Environment FNR-139.

3). Indiana Department of Natural Resources Division of Forestry. Talking About Trees: A Glossary of Terms used by Foresters.

4). Forestry and Natural Resources, Cooperative Extension work in Agriculture, State of Indiana, Purdue University. Woodland Management FNR-111

5). Fischer, Burney. 1998 USDA Urban Forestry State Achievements Report: Indiana www.indiana/urbanforestry/uci_acn98/state_m.html

6). Indiana Department of Natural Resources Division of Forestry: Grant Programs. www.ai.org/dnr/forestry/numdocs/grants.html

7). Indiana Department of Natural Resources Division of Forestry: Forest Management Concepts.

8). Indiana Department of Natural Resources Division of Forestry: Tree Planting Instructions.

9). Indiana Department of Natural Resources Division of Forestry. Forest Improvement Handbook: Stewardship for Tomorrow.

10). 1995-1998 Forest Health Highlights: Indiana www.wnow.neres.umn.edu/mn-93/m_93.html.

11). Indiana Department of Natural Resources Division of Forestry. After a Harvest.

12). Indiana Department of Natural Resources Division of Forestry. State Nurseries & Tree Seedling Sales. Www.ai.org/dnr/forestry/numdocs/nurs.html.

13). Indiana Department of Natural Resources Division of Forestry. Timber Marking.

14). Indiana Department of Natural Resources Division of Forestry. Woodland Opening Plantings.

15). Indiana Department of Natural Resources Division of Forestry. Timber Stand Improvement Plantings.

Section 3

Non-Industrial Private Forests: Stewardship Programs

Jamie Sommer

Indiana's Nonindustrial Private Forests

Indiana has a unique situation in regards to Nonindustrial Private Forests (NIPFs). 87 percent of Indiana's forests can be classified as private land. This creates a problem because no laws or regulations can restrict actions on private land. The government and the environmental community are left helpless, and they can only hope that NIPF owners will be responsible enough to take care of their land. Some voluntary programs are in place, but even they are not very effective at this time. For the most part the ineffectiveness results from a lack of participation in stewardship programs set up by the state. One of the main reasons for this lack of participation is concern for private property rights. In a recent study, a majority of private forest owners felt "society should regulate landowners' activities only if they cause demonstrated harm to adjacent lands or resources" (Brunson 17).

Even though most NIPF owners in Indiana do not consider timber production to be their main benefit of the land, 45 percent of the respondents claimed that at one time they had sold timber for profit. This is important because less than 10 percent of the group thinks that if conflict occurs between the environment and some other economic objective, the environment should win (Brunson 17). Stewardship programs will only be effective if they appeal to the landowners' economic interests as well as their sense of environmental ethic. However, all efforts to promote involvement must not forget the main goal of the stewardship programs: sustainable forestry. The American Forest and Paper Association defined it as:

> "Sustainable forestry means managing our forests to meet the needs of the present without compromising the ability of future generations to meet their own needs by practicing a land stewardship ethic which integrates the growing, nurturing and harvesting of trees for useful products with the conservation of soil, air, and water quality, wildlife and fish habitat, and aesthetics." (Forest Legacy Assessment of Need (AON) 19)

Current Stewardship Programs

One of the voluntary programs available to private forest owners in Indiana is the Classified Forest Program. Established in 1924 by the IN Department of Natural Resources Division of Forestry, the program strives to encourage private landowners to properly manage their wooded areas. There are currently almost 8,000 areas in the program, each containing at least one tract of 10 acres. The total acreage of land in the IN Classified Forest Program nears 400,000. In order to qualify for the program, the area must be at least 10 acres and contain growth of approved trees specified by the DNR. Owners are encouraged to classify their land through tax incentives and free technical assistance. Each acre in the program is assessed at a value of $1 for tax purposes. The district forester is available to members of the program to offer advice on managing their land. The only requirements of owners of Classified Forests are that they develop a written management plan with the help of a forester that describes the current condition of the forest and the development plan for the area. Overall, they must meet basic standards of good timber management as approved by the DNR.

Timbering on classified land is allowed, but the owners must notify the district forester of the sale within 60 days. No laws regulate the methods of timbering allowed, but the owner must harvest in a manner so that the land still meets the requirements of the program for quantity and quality of trees remaining. Timber harvesting is not required, but is actually recommended because if done properly, it improves the forest's total health. Once the land enters the program, it may not be removed without penalty. The difference in taxes paid if the land had not been classified, in addition to a 10 percent interest charge, must be paid when the forms to request removal are filed. (Classified Forest Program).

Another type of stewardship program available to NIPF owners is the cost-share assistance program. Originally set up as four different programs sponsored by the Federal government, cost-share assistance is now offered at the state level as well. The programs are designed to increase productivity on NIPFs and offer financial assistance. Some NIPF owners are reluctant to optimize their forest productivity because of financial restrictions. The cost of up-front capital and the low expected rates of return deter many owners, but the program's goal is to help with the cost and improve the efficiency and quality of timber being produced (Haines 1). Three cost-share assistance programs exist in Indiana. The Forest Improvement Program (FIP) is for owners concerned with they supply of wood products. The Forest Stewardship Incentive Program (SIP) deals specifically with stewardship on private woodlands. The Conservation Reserve Program is set up to convert cropland at risk of erosion into forestland (IN Division of Forestry, cost.wpd, 1-98).

The cost-share assistance program covers four practices including timber stand improvement, tree planting, critical area stabilization, and some fencing and wildlife practices. The maximum amount of refund offered through these programs is 50 percent of the cost, regardless if a professional forester is consulted. Other requirements such as minimum land to be entered varies with each program, but all require that owners follow a management plan approved by a district forester and that the land must be entered into the program for a minimum of ten years. Some Long Term Agreements are available for projects that will cost more than the maximum refund allows (Cost Share Assistance Program).

Other stewardship programs include the Classified Wildlife Habitat Program and the Indiana Heritage Trust Fund. The Wildlife Habitat program is very similar to the Classified Forest program, but the designated area must be 15 acres instead of 10 and the required species

of plants and trees are different. The objectives of the program are broader, but they still benefit forestland and provide economic incentives to the NIPF owners. The IN Heritage Trust Fund sets aside money from the sale of environmental license plates for the purchase of land from willing private forest owners to be set aside as state parks and forests, wildlife areas, or other areas by the DNR (Forest Legacy AON 22).

Other methods of protecting NIPFs are Land Trusts. While not administered by the government, they have been successful in protecting land that might have otherwise been converted to non-forest use. Land Trusts often acquire land or interests in land by purchasing or sometimes receiving them as donations. The Nature Conservancy is one of the larger and most active land trusts in southern Indiana. They manage all of their land under a stewardship program that aims to promote biological diversity. Other land trusts operating in Indiana include the Sycamore Land Trust of Bloomington, NICHES Land Trust based in Lafayette, the Central Indiana Land Trust, and Riverfield, which is based in Kentucky.

One final program that has recently been implemented is the Forest Legacy Program. Congress originally established it as part of the Food, Agriculture, Conservation, and Trade Act of 1990. Its stated purpose was "to identify and protect environmentally important privately-owned forest lands threatened by conversion to non-forest uses through purchase of conservation easements and fee-simple acquisitions" (Forest Legacy AON 1). In 1995, the IN DNR Division of Forestry began the process of developing a Forest Legacy Program. The State Forest Stewardship Coordinating Committee and the IN DNR developed an Assessment of Need (AON) that was presented to the US Department of Agriculture in July of 1998. The USDA approved for admittance six areas that had been recommended in the AON. Other nominations for Forest Legacy areas will be accepted in early 1999.

The Forest Legacy Program hopes to achieve 12 goals. They include protection of NIPFs threatened by conversion to non-forest use, reduction of forest fragmentation, provision of recreational opportunities, watershed protection, and links to and buffer areas for other protected areas, both private and public. Other goals include maintaining scenic resources, protecting threatened and endangered species, and providing employment opportunities and economic stability (Forest Legacy AON 28).

The USDA provides 75 percent of the funding through the Farm Bill of 1990, and the remainder comes from non-federal sources. The owner of the parcel of land receives a one-time cash payment for the development rights to their land. They do not give up the actual property rights to the land. The owners are committing themselves permanently to protecting the forestland. The community benefits from the program because of the addition of green that ensures a high quality of life standard for years to come. Some may see the permanent commitment to the program as a disadvantage because it may restrict future owners' options of what they can do with the land. For example, no building or development is allowed in Forest Legacy Areas. However, the permanence of the program is what ensures that the land is safe from future harm. Owners of Forest Legacy Areas will still be allowed to harvest timber, cut firewood, hunt, and produce other non-timber products, but prohibited activities include building, fencing, grazing, and mining or quarrying that requires surface disturbance (Forest Legacy Program). Owners must also prepare and implement a Forest Stewardship Plan or a multi-resource management plan. Land set aside for the program may also be enrolled in the Classified Forest Program and therefore qualifies for free technical advice from the district forester as well as a tax break.

The six areas that were identified by the 1998 AON are Southwest Bottomland Forests, Blue River/ Knobstone Escarpment, Bluegrass Area, Maumee Basin, Northwest Moraine and Shawnee Hills/ Highland Rim (See Appendix 1- map of forest legacy area). The Shawnee Hills / Highland Rim area is the largest of the six and includes Brown, Morgan and Monroe counties among others. The Forest Legacy program in this area will aim to protect the forestland surrounding the Lake Monroe watershed, improve the quality of drinking water in the Bloomington area, protect the forests that communities rely upon, protect the scenic landscapes and also help maintain contiguous forest land by linking public and private land (Forest Legacy AON 44).

Challenges facing Indiana's Stewardship Programs

In the early stages of developing the AON, Ben Hubbard, the Forest Legacy Coordinator with the IN DNR, mailed a survey to various individuals and organizations that "have expressed an ongoing interest in Indiana's green space and forests" (Forest Legacy AON D-1). The survey asked the respondents to identify what they felt were the issues most important to protecting Indiana's forests. Among the issues ranked most important were forest fragmentation, availability of timber for products and taxes, or other impediments to forest ownership. Other issues listed included land use planning, lack of education, the right to harvest, conversion of forest to other use, quality of life, and the management practices of NIPF owners.

NIPF owners are responsible for managing their own land, and of the main problems that they face is a lack of education regarding proper methods of management. They control 90 percent of the forestland in Indiana but have the least amount of expertise in forestry practices. State and local agencies are making efforts to reach these owners and provide them with information, but it is often difficult to reach them. The number of private owners and their

diverse characteristics make it even harder to provide them with recent and relevant information. No stock advice that can be given to all NIPF owners exists because owners' situations vary. The management plan of an owner with 1000 acres is not the same as someone with 15 acres. They will both have different goals and strategies. For example, ½ of NIPF owners harvest timber, but for a majority it is not their primary use (Kuhns, Brunson and Roberts 42).

In a study conducted by Kuhns, Brunson and Roberts, several methods of contacting and educating owners of NIPFs were examined. Owners in Utah and Indiana were used as representatives of the two extremes of forest ownership. The federal government owns most of Utah's forests, but Indiana has far more private owners. The respondents were asked about the extent and origin of their forestry knowledge. 61 percent of NIPF owners in Indiana felt that they had moderate forestry education, but 15 percent still felt they knew very little. Larger landowners tend to have more forestry education experience, but even the majority of that knowledge tended to be informal. Newspapers and magazines tended to be the place looked to most often for information, but extension publications and advice from their agencies rated particularly high in Indiana. These sources were of more use to those with lower education than those with higher, often used university specialists and textbooks. A consensus was reached among all groups that the least preferred method was electronic technologies such as videoconferencing, videotapes, radio and television, but printed information and personal contact with a forester ranked highest (Kuhns et. al 40).

Two other directly related threats to Indiana's forests are urbanization and parcelization. Between 1967 and 1986 Indiana lost 13 percent of its forestland with 25 percent of it going to urbanization and another 25 percent to cropland (Competitive Challenge 35). Nationally, 10 million people own ½ of the total forest acreage and that is increasing at a rate of 2,500 new

owners per week (Argow 33). This also means that the average ownership size is decreasing. A 1996 report stated that 90 percent of private owners currently hold less than 100 acres (Kuhns et al 42). It is estimated that by 2010, 95 percent of all forests will be divided into areas of 100 acres or smaller. (DeCoster 25). This fragmentation makes forestry education much more difficult and costly. As mentioned earlier, large groups of new owners may have particularly different goals than past owners. In addition, it will create additional burdens for already understaffed state forestry and extension agencies.

The existence of smaller parcels creates a larger market in need of education about forest management practices, but that is part of the problem. The three main causes of parcelization are division among multiple heirs after a death, huge increases in property taxes while earnings of owners continue to come from work unrelated to forestry and the appreciation of forest value does not simultaneously increase as well, and a change in lifestyles where forests are used as decorations only. Many of the smaller owners may not even see their parcels as being large enough to be worthy of a management plan. Thomas Birch found in his study that smaller landowners are least likely to use the stewardship plans and tax incentives offered by the state. In his study on the parcelization of forests, Lester DeCoster refers to a phenomenon called the "Catch-22 of Occasional Relevance." Its two components say that " 1. Most forest owners rarely seek forest expertise because it is not relevant to them most of the time. 2. When occasional events make forest expertise relevant, most owners won't know how to find it because they haven't sought such information before" (26).

In light of the fact that many forest owners now are not seeking the expert advise available to them and the number of NIPF owners who have little or no forestry experience is increasing at an astonishing rate, a new approach to stewardship is needed. The first step is to

help owners resist parcelization. Current forest owners need not only to understand the importance of green space for future generations, but also the need for larger tracts of forestland to remain contiguous. This could be accomplished by changing tax policies and regulations regarding private forests. For example, Delaware forgives all property taxes for thirty years with the acceptance of an approved forest management plan (Argow 32). State agencies and extension groups can also encourage participation in current stewardship plans such as the Classified Forest Program or the Forest Legacy Program, which both provide economic incentives to help alleviate the difference between the increasing property tax rates and the lack of growth in appreciation of forest value. Another option to help owners resist parcelization is to develop a joint management program as suggested by Katheryn Summers in her paper "Joint Management of Nonindustrial Private Forests: An Alternative Method of Encouraging Stewardship in Indiana."

One idea to encourage participation in stewardship programs and to ease the load of the forest service agencies is to implement a social marketing plan. The goal of such a plan is "to convince NIPF owners that they should develop forest stewardship plans that both meet their needs and are consistent with ecosystem management goals" (Tyson, Broderick and Snyder 36). For a stewardship plan to be effective, it must be implemented by a large number of participants. Since a lack of education exists regarding the available programs and proper forest management in general, promoting awareness and participation in the programs should be the focus of the forest service and extension agency's efforts. Their jobs will become more difficult in the future because of increasing parcelization of forestland, and a social marketing plan will help them target a specific audience and therefore be more effective. Voluntary programs have the potential to be very successful if they are targeted to the proper audience (Summers 9).

Public and private interest groups in Connecticut have been working on implementing a social marketing plan to target the owners of NIPF surrounding the Connecticut River in an area called the Eight Mile River watershed. The first part of their plan included dividing the owners into four groups based on their land use intentions. A survey was issued to the landowners that analyzed their sense of environmental ethics and how they associated their actions with threats to the community and to themselves. Intenders show interest in developing a stewardship plan. Nonintenders plan to give their land to family members but have taken no action toward entering a stewardship program. Planners have already implemented a stewardship program or committed themselves to protecting their land. Sellers do not plan on keeping their land for much longer, but rather they intend to sell it in the near future and therefore have no interest in a stewardship plan. Priority for a social marketing campaign went to the intenders and the nonintenders in the Eight Mile River watershed. The first group already shows interest and has "the greatest chance of success for a given amount of effort" (Tyson et al 38). The nonintenders on the other hand already possess a certain sense of environmental ethic in that they want to pass their land on to their family. If that sense of ethic is stressed, then they might be able to be convinced to join a stewardship program. These two groups would most like to see information in newspapers and other publications from state forestry and extension agencies. Although information was received from neighbors and town officials, it was thought to be the least credible. (Tyson et al 39).

Another problem facing NIPF is the decreasing quality of timber. The amount of forestland in Indiana is growing, but the quality of tree species is deteriorating. Some of the reasons for this decrease in quality are too much demand with not enough supply and "high grading" or cutting down all the best species of trees which leads to eventual degradation of that

species (Competitive Challenge 34). The demand and supply problem has two dimensions. An increased demand for wood products exists, but there is also a huge demand for tree seedlings. In 1994, the demand for seedlings in Indiana exceeded supply by 600,000. Just five years later, the difference is up to 1.5 million seedlings and that translates to 2,500 acres of land not being planted each year. State nurseries are doing their best to help alleviate the problem. The two nurseries in Vallonia and Jasper-Pulaski have expanded the tree species of seedlings they are offering from 45 types to 53 types. Unfortunately, the quality of the newly introduced species is inferior to the other highly popular species. The shortage of seedlings always presents a greater problem to NIPFs than to public land. State and Federal lands get first pick of the seedlings. Usually, they take as many as they need to fill their land, and it is the private forest owners who end up with a lack of seedlings (Seifert 1). Even though NIPF compromise 90 percent of forestland in Indiana, private owners still must wait until the state and federal governments get their first pick of tree species and quantity. Some form of prioritization or proportion system should be in place to assure that the private owners receive a fair amount of seedlings of decent quality.

Conclusion

The programs that Indiana currently has established regarding the management of private forestlands, especially as they relate to timbering policies, have the potential to be effective. Unfortunately there are several impediments that may stop their success. The first major obstacle will be educating the landowners of the importance of taking an active interest in their land and proving to them that no area is too small to be worthy of a management plan. Once they have been convinced of the need for a plan, they must then be educated about the different options available. This represents the "catch-22" that DeCoster describes. By creating a social

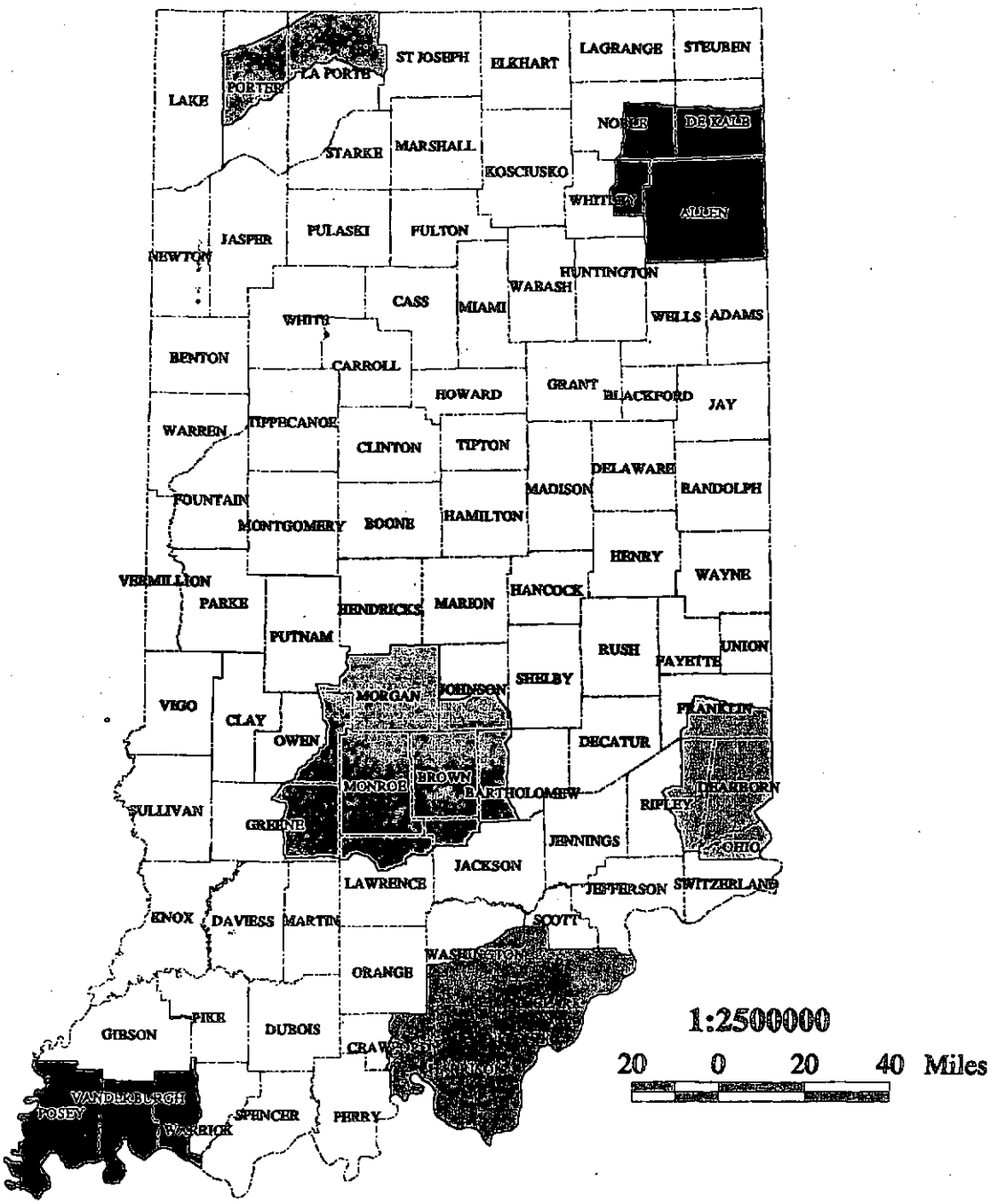
marketing program that more narrowly defines the target market for the stewardship programs, forestry agencies stand a better chance of protecting the land for the future.

The programs in existence will not be enough to solve all of the problems though. The parcelization of land will continue to spread until more incentives are created. New tax incentives and increased knowledge of stewardship programs should help to prevent the trend toward larger numbers of smaller tracts of land. Owners need to be assured also that the speculation of forthcoming regulations will not force them to harvest their lands as has been suggested by some NIPF owners (Johnson, Alig, Moore and Moulton). Keeping private owners aware of the current state of forests, their community, and the law and regulations that they must abide by or may have to in the future is the key to protecting NIPFs.

Appendix 1

Indiana Forest Legacy Areas

Proximity Map



Map 6

County Boundary

Blue River Basin / Knobstone Escarpment
Northwest Moraine
Maumee Basin
Bluegrass Area
Shawnee Hill / Highland Rim
Southwest Bottomland Forests

Source Data

County boundaries from U.S. Census Bureau TIGER files

Forest Legacy Boundaries from U.S. Census Bureau TIGER file county boundaries and U.S. Geological Survey 100:000 DLG roads

Works Cited

Argow, Keith. "This Land is Their Land" Journal of Forestry. February 1996. p31-33.

Brunson, Mark, Deborah Yarrow, Scott Roberts, Davie Guynn Jr., Michael Kuhns. "Nonindustrial Private Forest Owners and Ecosystem Management: Can They Work Together?" Journal of Forestry. June 1996. p14-21.

"Classified Forest Program" http://www.state.in.us/dnr/forestry/htmldocs/clasfor.htm 2/28/99.

Competitive Challenge, DNR Division of Forestry, April 1993. p33-38.

"Cost Share Assistance Program" http://www.state.in.us/dnr/forestry/htmldocs/grants.htm 2/28/99.

DeCoster, Lester. "The Boom in Forest Owners- A Bust for Forestry?" Journal of Forestry. May 1998 Vol 96, Number 5. p25-28.

"Forest Legacy Program" http://www.state.in.us/dnr/forestry/htmldocs/legacy.htm 2/28/99.

Haines, Terry. "Federal and State Forestry Cost-Share Assistance Programs: Structure, Accomplishments, and Future Outlook."

Indiana Department of Natural Resources Division of Forestry: Cost Share Assistance. Indiana Division of Forestry, cost.wpd, 1-98.

Indiana Forest Legacy Program Assessment of Need Final Report, December 1998.

Johnson, Rebecca, Ralph Alig, Eric Moore, Robert Moulton. "NIPF Landowners' View of Regulation" Journal of Forestry. Jan 1997 p23-28.

Kuhns, Michael, Mark Brunson, Scott Roberts. "Landowners' Educational Needs and How Foresters Can Respond." Journal of Forestry. August 1998 Vol 96, Number 8. p38-43.

Seifert, John. "Demand for Tree Seedlings Exceeds Supply" The Woodland Steward. Winter 1999, Vol 8, Number 1. p1.

Summers, Katheryn. "Joint Management of Nonindustrial Private Forests: An Alternative Method of Encouraging Stewardship in Indiana" December 1998.

Tyson, C. Benjamin, Stephen Broderick, Leslie Snyder. "A Social Marketing Approach to Landowner Education." Journal of Forestry. February 1998 Vol 96, Number 2. p34-40.

Section 4

Challenges and Alternatives to Encouraging Management of NIPF Lands

Kristen McClarty

Non-industrial private forest (NIPF) landowners play a vital role in sustaining forest resources and providing timber for consumer's needs. Their dominance is best demonstrated by their ownership of nearly 60 percent of commercial forestland in the United States. Their participation is crucial because of the reduction in timber harvests on Federal Lands.

The challenge to maximizing the potential of this sector of timbering is the lack of government regulation of NIPFs in Indiana. This lack has prompted the creation of many Federal and State programs aimed to provide incentives to these landowners. The lack of prior capitol and the low-expected rates of return act as true physical barriers to private landowners. The incentives provided by the programs include cost-share assistance, help in developing management plans and tax deductions, among other rewards, which spur landowners to practice better management policies.

The compensation for persuading the nearly 10 million NIPF landowners across the US to manage their lands appropriately and pursue sustained-yield management is great. Especially since the number of landowners has increased by over 2 million in the past 15 years and also because of larger estates being parceled into land under ten acres (Argow 1996).

It is understood that landowners' reasons for joining stewardship programs lie in the benefits derived from tax-break financial incentives, continuation of previous land use, encouragement by foresters, personal values and assistance in meeting management goals. Financial incentives are the main reason why many join (Summers 7).

The reality that only five percent of landowners nationwide have a written management plan, points to the inherent insufficiency of the Federal and State programs (Birch 1995). If Federal and State agencies could increase the amount of financial benefits, relying on additional

sources for funding, there may be an increased number of participants, thus creating more timber for public use. There are numerous other ways to incite better management in NIPF landowners, including education, help from foresters, utilizing community forestry, incorporating certification, increasing cost-share assistance and possibly using conservation easements.

Sources of funding for state programs, including those in Indiana, are a challenge and impair the amount of money that can be given to private landowners. The Indiana Heritage Trust Fund is an example of a source of funding that is working for the State. With over $25.7 million earned from license plate revenues, the State is able to purchase land for conservation purposes. By increasing Indiana's resources for funding other programs, including the Forestry Cost Share Assistance Programs, the State could provide larger incentives for NIPF landowners. Currently the cost-share figure is 50 percent through the Department of Natural Resources. Examples of taxes in other states that have been successful are: use of lottery funds in Iowa, retail sales tax -- one eighth of one percent of the sales tax is collected -- in addition to the revenue from hunting and fishing licenses in Missouri, or Texas' method of collecting a tax through a voluntary assessment on primary forest products, from all major forest products companies who receive wood from Texas, including Arkansas and Louisiana. In addition Texas private landowners are encouraged to give one percent of their timber revenue and homebuilders are asked to contribute $70 per home constructed to the program (USDA).

Despite the many incentive programs available, landowners seem apathetic towards managing their land. Often, when the number of participants in a group is large, the typical participant will know that his own efforts will probably not make much of a difference to the outcome, and as a result, will be affected by the group's decision in much the same way, no matter how much or how little effort he puts into studying the issues (Olson 53). Because the

group of private foresters is so encompassing, many feel they play a small role, and thus feel no need to contribute. They assume national foresters or other industrial foresters will meet the nation's timber needs.

With 9.9 million (1994) private landowners it is important to understand where and how they receive the information they have. Many discover new information about programs from friends and neighbors, publications and mailings, resource consultants, and career, education or previous experiences (Summers 7). Private landowners need to be connected with resource consultants who could explain to the opportunities that exist for various voluntary stewardship programs. Currently only 20 percent seek the assistance of a professional forester in selling their timber (Argow 1996). Knowledge of current programs is low among Indiana NIPF landowners. Indiana needs to appropriate media sources accordingly, if they are to maintain their stature as a leading resource for timber. This could include direct mail, newspaper ads, television spots during the local news, etc. Education of current programs could also be attained by having a forester meet with a group of community members who indicate they are interested in learning more, helping to alleviate the saturation of owners on fragmented plots.

One of the main deterrents to joining incentive programs is citizen's inherent opposition to regulation by government of their private land. People are unwilling to accept a decrease in autonomy about decision making on their land (Koontz Carlson, Schweik 20). Indiana's role as a monitor over private lands is not prominent. Unlike many states, Indiana is not restricted by a state Forest Practices Act. This is in direct contrast to California where their Z'Berg-Nejedly Forest Practice Act, which has been in effect since 1973, regulates private land use activities heavily. State agencies in California have influential power over what NIPF people can do on

their own lands. Instead, owners and timber operators are encouraged to abide by voluntary best management practices (BMP's) when cutting trees in Indiana (Koontz et al 16).

Enacting a state forest practices act, or mandatory BMP laws has been met with much opposition in Indiana. Many view even the Classified Forest Program as being too much of a government intervention. Even though these programs have the power to reduce the financial risk of harvesting timber for those NIPF landowners who are reluctant to do so for this reason.

One solution to landowners aversion to government regulation is forming community forums to discuss issues that are relevant to those citizens. This method has been successful in the northwest corner of Adirondack Park in New York State. Foresters there meet informally with landowners to share ideas and tools for problem solving, thus increasing the public's understanding of forestry (Luzadis, Thill 16). When Northwest Flow landowners share stories about their land, it helps foresters introduce new conservation and management tools. "They hear that their neighbor does prescribed burning," Forester Tim Burope said. "That's a tool I'd like to use more and more. It is more interesting to a landowner when a fellow landowner uses that tool than when a professional forester suggests it (Luzadis et al 18)." This exchange of relevant information allows common problems to be solved once, rather than re-creating a solution to the same problem each time. Therefore forest management is more efficient and has the benefit that the information administered is from fellow foresters, rather than the government.

Other incentives to engage NIPF landowners manage their lands, while bypassing government intervention is to set up a joint management program, similar to a program established in Plainfield, Massachusetts. Participants agree to create a "Stewardship Neighborhood" where they share plans, hire the same forester, logger, share access roads, etc.

This would work with Indiana landowners if they are assured that others in the community will be involved in this type of program. Using tax and/or costsharing incentives, while insinuating that the their own flexibility in managing their own parcel won't be threatened, will aid in a worthwhile joint management plan (Summers 10-19).

An additional explanation for the disinterest in managing and timbering private lands is the low amount of profit earned on timber. Only about three percent of landowners cite timber production as their primary objective (Arogow 1996). One reason for these low prices garnered is due to the federal government's ability to flood the market with federally subsidized timber, keeping prices artificially low. As a result, wood today sells for less than it did in the 1970s (Native Forest Council (NFC) 7).

From 1980 to 1991, the Forest Service timber program lost $7.3 billion dollars. This is due to mismanagement of money and the factual reality that the land the National Forests are situated on were lands that were donated by homesteaders, settlers and railroads, because it was acreage that was usually mountainous, dry and cold, with thin and rocky soils. Trees grow neither large nor quickly on these lands, which are largely inaccessible (NFC 5). The Native Forest Council, among others, recommends a zero-cut policy on National Forest lands as one solution to the below-cost sales that pull timber companies to the national forests. Though the National Forests provide 12.3 percent of the nation's wood, it is believed there would be no shortage of timber. Half of the loss would be supplied by the private landowners and the other half by wood substitutes, according to the Native Forest Council. The price of the lumber would increase only 7.5 percent in the next 25 years. To end cutting on National Forests could save taxpayers money and may encourage landowners to harvest their own lands in a market that would thrive on competition and good management practices. Otherwise private landowners are

either over-cutting their lands to compensate for lost profits as they struggle to compete with the subsidized public timber or they are not depending upon their land for income at all, thus not benefiting anyone.

Using certification of forest products to reduce the negative impacts of commercial forestry and inform the consumer that the product was harvested from lands that were managed effectively, may give NIPF landowners an advantage over other timber producers, especially if a zero-cut policy took effect. It creates market incentives for producers to responsibly manage forests and harvest timber. There are two main certification branches available: the Forest Stewardship Council (FSC) and Smartwood. These are international certification programs that have managed to certify over 3,449,000 acres.

In a study conducted by Jeffery Hayward and Iliana Vertinsky, the central motivations for becoming a certified forester among NIPF landowners, was to improve market share, utilize third party audits to validate the quality of forest management, to satisfy intrinsic needs, such as learning and fulfilling societal values by meeting forest stewardship responsibilities. Also the economic gain was considered, but not as much of a consideration for NIPF landowners. A management plan is required for the certification process, which may include developing forest inventories, quantifying stand structure objectives, calculating harvest projections, developing fire management plans and harvest plans - which are all costly steps. It was found that the direct cost, the forest assessment audit and the annual audits were most bothersome to NIPF landowners, but the indirect costs, improving management, were not as much of a concern.

The momentum for certification is much greater in Europe than it is in the United States. This is mainly because few are demanding certified products in the US. There is a lack of public awareness and understanding of the certification process. Many anticipate a demand for certified

wood and the emergence of a market premium that will set them above the competition. One of the most popular trends on private estates currently, is the fragmentation of land due to a number of factors. It is projected by 2010, 95 percent of the private forest ownership's will be in parcels smaller than 100 acres. These owners will control 150,000,000 acres: 38 percent of all US private forest lands (DeCoster 25). In Connecticut alone, the percentage of woodland owners with less than 10 acres grew from 55 percent in 1972 to 79 percent in 1993 (Tyson, Campbell, Grady 4). The fear associated with these crucial numbers is the lack of interest these new landowners will have in harvesting their lands and seeking forestry advice. Plus the sheer challenge posed for foresters to meet the needs of this increased number of owners on smaller tracts of land will impede timber production.

The catalyst behind parcelization is high estate taxes assessed on inheritance property. The land is usually being divided among multiple heirs and sold to pay high estate taxes. Dramatic increases in annual property taxes also push land out of long-term forest use (DeCoster 26). In addition, the lifestyles of new owners are not tailored to forest work. Many of these people maintain urban jobs and primarily live on the land because of the aesthetic beauty it provides. This is a justified reason to live in the wilderness, but the implications of high numbers of people gaining control of unregulatable land that has the potential to serve as a public good is frightening to many. Owners automatically view the land as less important for management because of its small size. When they realize they need help with the land, many do not know where to find help. The need for creation of better methods that are situated to small landowners and motivates them to seek information and manage their lands is dire (DeCoster 27). In addition current tax laws encourage fragmentation, on the part of the government. Each time a piece of land is parceled it is taxed. If the average ownership size is to be 17 acres (too

big to trim and too little to log, at least with traditional equipment), there needs to be new approaches and technologies designed for small parcels (DeCoster 27).

The main worry over fragmentation is the loss of control of a significant amount of land and the fear of deforestation of that land to pay for the land transfer or because of different values held by the new owner. One creative tax initiated by Maryland is an agricultural transfer tax on lands converted from woodlands to non-agricultural uses. This tax funds their Woodland Incentive Program. This is something Indiana could implement to persuade owners not to clear-cut newly acquired lands for monetary gain and to encourage the use of a management plan.

One way to persuade new, inexperienced small private landowners to get involved with their lands is to practice Woodscaping. This is a blend of forestry, arboricultural, horticulture and wildlife conservation activities (Tyson et al 6). It may not promote harvesting of timber but it is a first step in generating interest in the abundant resources each fragmented piece of land embodies.

Another potential solution for fragmentation is zoning, but it is generally understood that would be strongly objected to by many landowners. Also the acquisition of lands for public use and retention could be a possibility, but this is very costly to the State and the lands themselves are hard to acquire, although Indiana has done very well acquiring land through its Indiana Heritage Trust Fund.

Involving a community in sustainable development projects may be a method that would interest those NIPF landowners that aren't ready to timber by themselves and would like the support and combined knowledge of their community members. This could include fragmented owners who are inexperienced and in need of help in timbering. Sustainable development requires expanding the range of opportunities available to people, increasing access to those

opportunities, and protecting and enhancing the resources where those opportunities are found (Bliss 30). It is based on public support and local solutions to common problems. Social dynamics of the communities are usually what determines if the program will succeed or not. The Countryside Institute, a non-profit organization that assists rural communities in North America and The United Kingdom, identified elements common to communities that have succeeded in moving towards their sustainablility goals. The qualities of most importance were the strength and sincerity of the relationships and interactions among community members and the extent to which they shared sustainability goals or values (Martinson 31). Using this strategy makes managing land seem more appealing and not so intimidating to those who find it to be a foreign hobby.

Giving small communities power over their largest resource, private forests, can help them to face issues that none would tackle alone. In Penobscot Bay, Maine, communities opposed land developments that would have a negative impact on their traditional culture and environment. Having the community element allowed them to pull together to combat these developments that would have been difficult to challenge alone (Martinson 31). But if a community does not recognize the need for the sustainability programs and it is not well organized, nor has it identified its concerns then this route will not succeed.

A significant consequence of poor management on private woodlands is the lack of species being reforested annually. Lands are often cleared without being reforested to maintain suitable levels of productivity. Oak hickory has been in decline over the years throughout Indiana. It was 60.8 percent of the forest type in 1967. That number has dropped to 31.9 percent. That number has been steady between 1986 and 1997. This is one of Indiana's most valued hardwoods.

An example of a program that aimed to encourage private landowners to reforest or restore their land has been demonstrated in Oregon. Their goal was to restore productivity on 250,000 acres of NIPF lands by 2010. The unique aspect of this program was that it was a venture capital program, meaning the state and the owner shared the risks and benefits of forest investment. Oregon supplied 100 percent of initial costs of reforestation or restoration up to a maximum of $100,000 over two years. In exchange, the landowner is required to reimburse the state, through a binding agreement, when timber from assisted acreage is harvested. This is based on a predetermined percentage of after-tax harvest revenues ranging from 10-25 percent. Because of the complexity of the contractual agreement and the requirement that a lien on the property be retained by the State, there has been low landowner response, but this program exemplifies ways to encourage reforestation on private lands (UDSA, Haines 13).

The incentive to plant new trees for NIPF landowners is on the decline even though reforestation of Indiana's private lands has been rising. But many NIPF landowners are upset about their inability to obtain seedlings through the two state nurseries, due to the large demand. In the last five years, demand has exceeded supply by 600,000 seedlings in 1994 to the current deficit of more than 1.5 million seedlings in 1999. In other words, there are over 200,000 acres of Indiana land that is going unplanted every year (Seifert 2).

A total of $110,000 was requested by the Stewardship Incentive Program for tree planting, with only enough federal funds to approve half that amount. The same has occurred with the Conservation Reserve Program, who requested $500,000, but only received half. If Indiana were able to increase its cost-share funds, twice as many trees could be planted under these programs (Hoff 7).

Prices on the seedlings were raised last year to help the Division of Forestry increase their production. This is essentially hurting the mouth the DNR intends to feed. The seedling price has increased 300 percent in less than a decade (Hoff 7). Making foresters pay for a public good when they are incurring the cost to produce the timber, is not an incentive by any means.

In contrast to Indiana's approach to "encouraging" reforestation, Florida began providing reimbursement for seedling costs in 1981, as part of their Restoration Incentives Program. Unfortunately the program was discontinued in 1993 due to budget cuts at the Division of Forestry. In addition, Illinois provides their seedlings free of charge to landowners who are in their Forestry Development Program. The program is funded by a four percent harvest fee that is deducted from timber sales (USDA et al 7-8). These are positive examples of ways to encourage NIPF landowners to reforest land that serves everyone.

Illinois has an extremely successful program that could provide an abundance of insight to Indiana initiatives to encourage management of NIPF lands. The Illinois Forestry Development Program, enacted in 1983 to improve management of timber and other resources on NIPF, corporate, industrial and municipal holdings of at least 5 acres in size. It is administered on a first-come, first-serve basis and is funded by the previously mentioned, four percent harvest fee that is deducted from timber sales. Funding has increased each year since inception of the program, inception from $24,079 in 1985 to $532,309 in 1992. Landowners participating in the program are eligible to receive a 50 percent rebate on harvest fees.

Cost-share payments are available for up to 80 percent of expenses incurred in carrying out practices specified in an approved 10-year management plan. In addition, as previously discussed, seedlings are available free of charge to landowners who have an approved reforestation plan. What is most interesting about this program is the amount of cost-share

assistance allowed and the unusual allowance of concurring State and Federal cost-share funds. Federal payments are made first, reimbursing 65 percent of incurred expenses; State funds further supplement the landowner for up to 100 percent of expenditures! The goal is to induce landowners to manage for timber production, despite the long-term investment required for hardwood species and the increasing pressure for urban and suburban uses of rural lands.

Their accomplishments include: development of 3,036 management plans for practices on 145,487 acres and cost-share payments of $2,761,800 from 1985 through 1992. The only reported problem with the program is the limited resources that have resulted in an extensive backlog of interested landowners needing a management plan. Some of the landowners have used cost-share payments to pay consultant fees for plan development (USDA, Haines 8-9).

In conclusion, the obvious consequence of industrialization is a shrinking land base. In 1967 there were 4.0 million acres of forestland in the state. Today there are an estimated 4.4 million acres of forestland in Indiana, 16.6 percent of the land base (LeMaster 13). Total acreage has increased, but the ability to harvest this land is challenging. As examined, the uses for the land vary from clearing the land for recreational homes to using it for urban expansion. In addition, many of the lands have been poorly managed and thus contain low quality timber.

Private landowners stand to gain ample profit from managing their lands correctly. From the sale of standing timber, logs, bolts, posts, pulpwood, and other products, woodland owners receive annually over $55 million. In addition the state itself profits heavily from NIPF participation in timbering. This profit comes in the form of salaries, wages, power and machinery that the manufacturer of forest products can earn (DNR). Salaries and wages of wood-workers exceed $440 million a year (Bureau of Census 1977).

It is apparent that the need to educate and encourage NIPF landowners to join government-sponsored programs that would enable them to efficiently create a management plan is immense. The rewards of this would not only benefit the landowners, but also taxpayers and the entire state itself. In order to entice these reluctant landowners, the State must redefine their programs in a manner that is consistent with the needs and desires of the landowners themselves. Alternative programs and sources of funding presented here may provide guidance for ways to improve these programs. Until NIPF landowners' demands are realized, the needs of the State and the Country's will not be.

Works Cited

Brendler, Thomas, Henry Carey. "Community Forestry Defined." Journal of Forestry. March 1998. p21-23.

DeCoster, Lester. "The Boom in Forest Owners - A Bust for Forestry?" Journal of Forestry. May 1998 Vol.96, number 5. p25-28.

Haines, Terry. "Federal and State Forestry Cost-Share Assistance Programs: Structure, Accomplishments, and Future Outlook." Research Paper: So-295 USDA. September 1995.

Hayward, Jeffrey, Ilan Vertinsky. "High Expectations, Unexpected Benefits: What Managers and Owners Think of Certification." Journal of Forestry. February 1999. p 13-17.

Koontz, Tomas, Laura Carlson, Charles Schweik. "Linking Satellite Images To Land Use Activities: An Exploratory Study of Southern Indiana Non-Industrial Private Forests." Center for the Study of Institutions, Population and Environmental Change. March 1998. p.2-4, 10-17, 20-23.

Kuhns, Michael R., Mark W. Brunson, Scott D. Roberts. "Landowners' Educational Needs and How Foresters Can Respond." Journal of Forestry. August 1998. p38-43.

LeMaster, Dennis C, Lois E. Rans. "Forest Policy Issues in Indiana." Department of Forestry and Natural Resources. Purdue University. p16-14.

Lindstrom, Tommy, Eric Hansen, Heikki Juslin. "Forest Certification: The View from Europe's NIPFs." Journal of Forestry. March 1999. p30.

Luzadis, Valerie A., Mary K. Thill. "The Adirondacks: Ecosystem Partners of the Northwest Flow." Journal of Forestry. August 1998. p16-19.

Martinson, Kristen. "Working with the Human Element in Sustainability Programs." Journal of Forestry. March 1998. p.31-32.

Olson, Mancur. "The Logic of Collective Action, Public Goods and the Theory of Groups." Chapter 2, p 53-65.

Seifert, John. "Demand for Tree Seedlings Exceed Supply." The Woodland Steward. Winter 1999, Vol.8, Number 1.p1.

Summers, Katheryn. "Joint Management of Nonindustrial Private Forests: An Alternative Method of Encouraging Stewardship in Indiana." December 1998.

Tyson, C. Benjamin, Stephen Broderick, Leslie Snyder. "A Social Marketing Approach to

Landowner Education." Journal of Forestry. February 1998. Vol.96, number 2. p34- 40.

Tyson, C. Benjamin, Susan M. Campbell, Ellen Schmidt Grady. "Woodscaping for Small Landowners in Southern New England." Journal of Forestry. December 1998. p4-7.

http://ceres.ca.gov/topic/env_law/fpa/reg/toc.html -- "CERES Environmental Law, Regulation and Policy."
http://www.ezl.com/ppg/zerocut.html -- "Zero Cut"
http://www.ezl.com/ppg/nottocut.html. -- "Not to Cut: That is the Answer"
http://www.fscoax.org/html/whatwedo.html. -- Forest Stewardship Council, A.C.
http://www.smartwood.org/ -- SmartWood
http://www.fs.fed.us/spf/coop/programs.html -- USDA Forest Service

Section 5

It's the Public's Land: The Legal Underpinnings of Public Forests and Land

Jonathan Goldberg

Humankind, as Thomas Hobbes described, is poor, nasty, brutish, and short. Consequently, we ask government to act as trustees of both the publics' interests and of the public's property such as our forests. Despite this entrusted power to protect our natural resources, ownership is implicitly public. If government's duty is to manage and care for the public's property, the regard given to upholding this duty should be reflected in both federal and state law. Failure by the government to manage the public's property constitutes mismanagement, and through the court system, the public may insure the government's accountability. Here, we will begin the examination of both Federal Law and Indiana statutes regarding public land and forests. After describing the legalities for forests and their management, a discussion concerning a recent challenge to Indiana's management of its public forests will follow. This 1996 court challenge was among the first attempts in Indiana to hold government accountable for the management of the public's land.

The "Publicness" of The Land

Understanding government's role in the protection of public forestland requires a new definition, describing the relationship between the public and the government. Carol Rose in her 1986 paper titled "The Comedy of the Commons: Custom, Commerce, and Inherently Public Property," provides a new definition regarding public property. She argues that we must look beyond a classical definition of "public" and "private" property. Rose claims that certain things such as waterways and roads are "inherently public" (Rose, 721).

Rose defines inherently public property as "vested property rights in the unorganized public rather than in a governmentally organized public...the public sometimes (has) a right of access to property whether or not a governmental body has intervened" (Rose, 721). In other

words, certain property is inherently public regardless of government's actions toward a public resource. Rose continues her argument by stating that government has "some enforceable duties to preserve the property of the unorganized public" (Rose, 721). While we trust government to be guardians for the public's property, ownership, nonetheless, remains within the public domain. Based upon Rose's argument, we shall define the aforementioned relationship by describing inherently public property as belonging to society at large, under the protection of government. Government's efforts to uphold this relationship regarding public forestland is reflected through both federal law and state statutes.

Public Lands Under Federal Law

Governmental control of public lands began when the "thirteen original states on the establishment of independence, and the new states formed out of the territory of such original states and admitted to the Union" (C.J.S., 443). The ownership of the land within the United States is based upon the concession of land by the states. However, Congress has "granted to the territories...public lands within the territorial limits" (C.J.S., 444). The United States holds its land in trust for the people, and any entity that may cause the United States to loose valuable property is in violation of the law. A state then "holds the public domain as absolute owner and may only use such land to benefit the people" (C.J.S., 445). Nonetheless, the federal government may choose to send power to the states to govern public land. This was the premise of public land as defined by the federal government.

Because of the large role land has acquired in the development of the nation, Congress has retained federal ownership of public lands, unless it determines that the distribution of that land would be in the public's interest. According to the Federal Land Policy and Management

Act of 1976, public land will periodically be inventoried and their futures projected through "a land use planning process," (C.J.S., 445) thus helping to determine the appropriate land proportions. Once Congress has determined the proportions and regulations concerning public land, the state must adhered to these rules. However, the states do have the power to control and regulate public lands within its boarders in accordance with federal guidelines.

Congress has vested the Secretary of the Interior with the power to make rules and oversee the use of public land. The Secretary's position requires that he or she execute the law and prohibit the waste or disposal of land to which a given party is not entitled (C.J.S., 449). The Secretary of the Interior is obligated to work with the public, developing and maintaining public lands. Under the Classification and Multiple Use Act of 1960, the Secretary of the Interior is responsible for the "retention and disposal of public lands under his domain...(that) would best comport with national interest and public welfare" (C.J.S., 449).

Timbering On Public Lands

A part of determining the use of the land in the public's interest is deciding upon how the land resources are used. One of these uses is timbering. "In general, no one has the right to cut timber on the public lands of the United States without its consent" (C.J.S., 451). Law prohibits cutting timber on public lands, and in fact, Federal law has made the illegal removal of timber a criminal offense. People may however, purchase a license to remove timber.

While people may remove the timber, any "boxing (or) chipping" of trees constitutes trespassing (C.J.S. 452). Boxing constitutes the "unlawful entry on land to box pine trees for the purpose of obtaining crude turpentine" (C.J.S., 690). According to federal law, timbering that is

done on state land may be pursued by that state. Interestingly, where federal guidelines are not present, "states are free to market the timber crop growing on state lands" (C.J.S., 457). Sates may also issue permits to harvest timber and sell "merchantable timber or timber which is liable to waste" (C.J.S., 458). State agencies or officials authorize permits for the cutting of timber. States retain the right to collect the fair market value from the sale of timber. "The power of the state to sell the timber on such land is subject to the limitations set out in the Enabling Act" (C.J.S., 488), declaring the sale of timber on state land versus leasing state land are distinctly separate.

Woods and Forests: Federal Law

Having discussed the relationship between the states and the federal government as well as a few laws outlining the use of public land, we direct our attention to a specific type of public land, woods and forests. Woods are defined as "large and thick collection of trees, and is synonymous with forests" (C.J.S., 687). A woodland is said to be forest land in a natural state whereas a forest is a "track of land covered with trees, or a track of woodland with or without inclosed intervals of open and uncultivated ground" (C.J.S., 687). It is the obligation of the district forester to enforce the law regarding the protection of both forests and timber.

The federal government reserves timberlands, synonymous to forests, for the public welfare. It is the right of Congress to provide for establishment of public forests reserves without the consent of the state and for "the acceptance if land from a state for inclusion in a national park" (C.J.S., 692). Powers have been vested in Congress to maintain national forests for recreation and to preserve the forests' "primitive condition" (C.J.S., 692). Public land set aside

for a forest reservation "is in legal effect the act of the President" (C.J.S., 692). The President may reserve unsurveyed lands for national forests.

"The state had the right to compel or encourage private owners to participate in a program for the forestation or reforestation of land...which no other beneficial use is contemplated" (C.J.S., 689). However, ownership of timberlands, remains with the federal government. The federal government may bring suit against those who timber illegally.

National Forests

National Forests are timberlands reserved for the public's welfare and recreation. Analogous to that of public lands, the federal government may issue licenses to private entities, permitting the use of the national forests, under the stipulation that the permit may be revoked at any time. "The federal government uses a percentage of the proceeds of national forests," (C.J.S., 701), to be allocated to states' public schools, roads, and other funds within the communities in which forests are located. According to the federal government, a state may create forest preserves "when necessary to promote public welfare," (C.J.S., 702), and shall be supported by state taxes.

Protection of our national forests remains in the hand of Congress. Congress's ability to protect national forests supersedes state laws. Congress may provide provisions to combat forest fires and may sell infested trees if they become "a menace to growing trees" (C.J.S., 697). Amending the Forest and Rangeland Renewable Resources Planning Act of 1974, the National Forest Management Act of 1976, created policy guidelines and required the development of new procedures for "Forest Service multiple-use planning and sustained yield timber management in

national forest system" (Congressional Universe, 1 of 3). The 1976 act also altered the planning for reforestation, timber production and sales. Additionally, the act requires "reports on wood utilization, wastes...and reforestation needs...(as well as) a study of Dutch elm disease control" (Congressional Universe, 1 of 3). Finally, the management act repealed clearcutting on national forest lands under the National Forest Organic Act of 1897. More importantly though, it requires that the rule making process include the public's participation regarding land management.

Federal Law permits state land to be set aside for timber. This land is otherwise known as a "sustained yield forest," (C.J.S., 702), to be used for educational purposes. The timber may be sold with the guidance of a "sustained yield plan" (C.J.S., 702). The plan provides for the management of timber cutting, stipulating that the removal be "of approximately equal volume of timber annually or periodically equal to the increment," (C.J.S., 702), of land allotted. The timber is sold to the highest bidder, who must then pay its fair market value. Proceeds from the sale are placed in the school fund.

Public Response to Management of National Forests

Where there is a law, there is a public and inevitably a political response. In 1994, Congress held oversight hearings regarding the Forest Service's role in managing the national forests. Testimonies, by the public, presented a vast number of their concerns. Dr. Ross Gorte, the director of the Food and Renewable Resources Program, spoke before Congress regarding Forest Service reform. Dr. Gorte presented four findings regarding the Forest Service activities. He stated that the Forest Service "emphasizes timber and other physical outputs in planning and decision making," (OH, 179), and that the monitoring of the forest planning process is inadequate. Dr. Gorte stated that budget decisions take precedent during planning decisions, and

that local communities are excluded from the forest planning process. According to the National Forest Management Act of 1976, The Forest Service is compelled by law to submit a forest management plan and include the public in the decision making process. Under the Sustained and Multiple Use Act of 1960, forest planning must balance the growing of timber with its harvesting.

Beginning a discussion regarding national forest planning, Dr. Gorte states, "the national forests are analogous to trust funds, with outputs as important as annuities. However, the ecosystems are the investments that generate the annuities, and their sustainability is paramount" (OH, 180). While the Sustained and Multiple Use Act of 1960 called for a balance of growing and harvesting, the National Forest Management Act of 1976, focused on timber management.

From these acts, FORPLAN, a computer model of forest management, created a timber-harvesting schedule, designed to maximize timber output from the national forests. Resulting from this schedule, according to Dr. Gorte, is an imbalance between forest preservation and forest output (i.e. timber). This seems counter to the intent of the legislation passed by Congress to protect the public's forests. Dr. Gorte suggested the Forest Service's imbalance, may be attributed to the inadequate monitoring. He stated that "monitoring has been inadequate to evaluate national forest planning and management" (OH, 180). He also noted that lack of monitoring also resulted in poor inventories of the national forests, thus affecting its management.

Establishing a national strategy for the planning of renewable resources, the Forest and Rangelands Renewable Resources Planing Act of 1974 (RPA), placed the power to both help in the budgeting process and in the local planning of resource management plans, with the Forest Service. Dr. Gorte suggested that the RPA is insensitive to local demands regarding forest

management. He concludes by stating that managing the forests would not be such an arduous task if the public had more involvement in the planning processes (OH, 184).

According to a report sent to Congress by Arnold Belle from the University of Montana and Jeffery Olson, the Director of the Belle Center for Forest Ecosystem Management, regarding the review of the Forest Service, the forest planning process, has "left many local communities feeling alienated from decision making; ...People living next to national forests who had long and personal relationships with national forest managers became disenfranchised" (OH, 383). Reflecting upon a shift in the Forest Service policy, the Forest Service began to require written statements from the public rather than placing vocal comments in high regard, consequently, they became less responsive to the public's concerns.

Placing the Forest Service again under fire, Roy Keene, the Executive Director of the Public Forestry Foundation, gave testimony before Congress. He stated emphatically, "we would like the Forest Service to reconsider the present system of timber sales that essentially puts the purchaser's logger (often the lowest bidder) in control over the most biologically sensitive and economically important part of timber management" (OH, 351). It is important to consider that federal law requires that timber be sold to the highest bidder and receive the timber's fair market value.

Indiana State Law: Title 14

While it is important to understand the federal guidelines surrounding public lands and forests, it is also critical to understand the states' interpretation of federal law as well as their programs to uphold their duty to protect the public's property. Specifically, we will look at the Indiana Titles for forests and state land. Section 14-23-1-1, currently, establishes the Indiana

Department of Forestry. The department is responsible for the "care, custody, and control of the forest land owned by the state, exclusively of state parks" (Westlaw, 691). The foresters maintain the nurseries for reforestation of state land. In addition, they sell the trees to private owners for the cost of production. Indiana's forestry department must also disseminate information regarding forestry in addition to making inquiries regarding forestry questions (Westlaw, 692). Lastly, the forestry division is required to examine the state forestland for the purpose of proper forest management, including "forest preservation and timber culture" (Westlaw, 693).

Title 14 establishes the State Forestry Fund as well. The state forestry fund is derived from state taxes collected on Indiana property in conjunction with the sale of state forestland or products. It is the responsibility of the department of forestry to "purchase, (supervise, and develop)..state forests and state forest land" (Westlaw, 695). Additionally, the fund is created for the growth and distribution of forest tree seedlings for both state and private forests. Finally, the state's department of Forestry is asked to provide assistance to farmers and private forest landowners, to help them better manage their forests.

Following the establishment of the Forestry Department and forestry fund, the State set regulations as to the proper management of the state forests. "It is the public policy of Indiana to protect and conserve the timber, water resources, wildlife, and topsoil in the state forests for the equal enjoyment and guaranteed use of future generations" (Burns Law, 327). Within this public policy statement is a call for the "employment of good husbandry, timber that has a sustainable commercial value may be removed in a manner that benefits the growth of saplings and other trees" (Burns Law, 327). This provided the state the ability to harvest timber and generate revenue from the cut timber.

Timber that has been cut for the purpose of sale is defined as merchantable timber. Merchantable timber "means live, standing timber and trees that are at least 14 inches in diameter at a place 4.5 feet above the ground" (Burns Law, 327). The state's Department of Forestry allows removal of merchantable timber, once a permit has been obtained. However, the forestry department must determine the set areas that lawfully may be cut, for those areas have been marked by a forest management plan. Accounting for local market conditions, "adaptability of terrain for cutting and removal of timber," (Access Indiana, 2 of 2) along with potential hazards surrounding timbering, the state forester shall determine the "feasibility of the department entering into arrangements for removal and sale of merchantable timber" (Access Indiana, 2 of 2). Eighty-five percent of the profit from the leasing will be deposited into the state forestry fund and the remaining fifteen- percent will be allotted to the county in which the state forest is located.

Indiana Law: Environmental Protection

"Indiana ranks 50th in both per capita and per industry spending on environmental and natural resources (issues)" (Bloomiquist, 1033). Although there have been some improvements made by the Indiana General Assembly toward better environmental regulations, Indiana remains behind in environmental protection. Consequently, one may see the state's dedication to better environmental standards through the management of the public's forests and the Indiana Environmental Policy Act.

In 1969, the United States Congress enacted the National Environmental Policy Act (NEPA), requiring that all federal agencies prepare a detailed statement outlining (its) actions (and) environmental impact" (Carmichael, 613). Through the passage of the NEPA, the federal

government hoped to set an environmental protection precedent that may be used as a model for the states. The NEPA requires federal agencies to account for environmental implications in their actions. In 1976, in the case of Kleppe v. Sireea Club, the Supreme Court determined that environmental consequences must be accounted for (Carmichale, 620). An agency may be found guilty of negligence if it fails to present a clear environmental assessment. Justice Marshall defined this negligence as "arbitrary, capricious, and abuse of discretion, or otherwise not in accordance with the law" (Carmichael, 621). Federal agencies must prepare environmental impact statements before engaging in various projects affecting the environment. Congress however, did not make the NEPA effective enough, for the act lacked clarity. "Most states, including Indiana, have modeled their acts more closely," (Carmichael, 623), to the NEPA model.

Unlike many states curiously, Indiana does not publish its legislative history; therefore, determining legislative intent of the state law is difficult (Carmichael, 638). Consequently, no litigation has arisen as a result of the Indiana Environmental Policy Act of 1972 (IEPA). Similar to the National Environmental Act, section 13-1-10-3 of the Indiana code (IEPA), requires environmental impact statements from state agencies. "IEPA employs the language of the NEPA verbatim," (Carmichael, 637), for it too, called for a balance between population and resource use. Dissimilar to the federal law, the Indian Environmental Protection Act does not give state agencies the right to deny permits based upon the results of an environmental review, whereas federal agencies may deny permits for projects.

Fortunately, Indiana has made a few improvements since 1972. The Indiana Department of Environmental Management, in 1994, in exchange for funding, reformed its rule making process. General Assembly bill SEA 302, provided greater accountability by including the public

notification of meetings and involvement (Bloomquist, 1048). Regardless of this minor alteration in law, Indiana as its federal counter-part, is a week law indeed.

Although Indiana's environmental laws may be relatively week, public opinion is strong and demands greater environmental protection. In fact, Representative McCloskey from Southern Indiana conducted a survey regarding the harvesting of timber on public forestland. The results, revealed that 69% of those surveyed were opposed to timbering on public forests (Ragette, www.wvhighlands.org/survey.HTML). More importantly though, the survey concerned the Hoosier National Forest. Perhaps, this should send a message to both Washington and the Indiana State House; Hoosiers want greater environmental protection for the forests, the public's land.

Hoosier National Forests: Challenging the Law

Government is more responsive when held accountable for its actions. Making government accountable regarding the public's national forest land, Andy Mahler from Paoli Indiana sued the United States Forest Service in 1996. Due to the Forest Service's decision to clear- cut forty-six acres as well as four acres of shelter-wood of dying and diseased red pine trees in the Hoosier National Forest, Mahler requested an in-junction to halt the harvesting operation. To understand the case, it is imperative to understand that "clear-cutting removes all merchantable tree from a unit of forest land at one time. (Whereas), shelter-wood cutting removes most of the timber volume from the unit while leaving designated trees to provide seed" (West's Fed. Supplement, 1562). Mahler, siting the National Forest Management Act, the National Environmental Policy Act, and the Migratory Bird Treaty Act, claimed that the Forestry Service was in violation of federal law.

Mahler sought judicial review of the 1991 Hoosier National Forest Land and Resource Management Plan, which called for "extensive public comment and included preparation of a full Environmental Impact Statement under the NEPA" (West's Fed. Supplement, 1561). A result of the 1991 Plan, reduced forty percent of the total amount of the permitted timber harvest and sales from the Hoosier National Forest. The Forest Service has divided the Hoosier National Forest into to regions otherwise known as Management Areas. Mahler challenges the Management review regarding a 50-acre portion of the forest. He claims that the Forest Service failed to account for potential effects on the environment.

Additionally, Mahler requested the judicial review concerning the Forest Service's decision to hold a salvage sale of the harvested pine trees from the 50 acres in dispute. As stated in a prior section, an agency is in violation of the law if it is found guilty of making decisions which are, "arbitrary, capricious, an abuse of discretion, or other wise not in accordance with the law" (West's Fed. Supplement, 1562). The court applied this rule to the categorical exclusions permitted under the NEPA. Finally, Mahler argued that clear-cutting was not the "optimum method," that could be used by the Forest Service to harvest the timber.

In a rebuttal of Mahler's claims, the Forest Service stated that it had complied with the 1991 Plan Amendment under the NEPA. The 1991 Plan Amendment permits the Forest Service to clear-cut when the "method of vegetative management would be optimal" (West's Fed. Supplement, 1563). The plan also states that clear-cutting is used for diseased and infested areas as well. The Forest Service also argued that the NFMA does not prohibit clear-cutting, for it calls for a balance of cutting and restraint. Finally, the Forest Service argued that the red pine trees are not native to the Hoosier National Forest and that their harvest would permit native hardwoods to grow.

Despite Mahler's arguments, the court found in favor of the Forest Service. The U.S. District Court found that under the current laws, (the 1991 Plan Amendment and the NEPA), the Forest Service had complied with the law, for a management plan had been conducted through the use of FORPLAN. The law however, does not spell out the required extent of the management plan. Interestingly, the court stated, "the Forest Service balanced a host of sometimes conflicting goals and needs in formulating...management prescription" (West's Fed. Supplement, 1565).

The Forest Service does indeed have conflicting goals, for it is responsible for both the protection and sale of timer resources. One also discovers with this case, that the term "optimum" is not required by the National Forest Management Act, which permits clear-cutting. Optimum may be used when it applies to a "method of meeting objectives and requirements of a relevant land management plan" (West's Indiana Digest, 47). Lastly, the court determined that the red pine salvage would not harm migratory birds under the MBTA. In the court's final decision, it found that the Forest Service was in compliance with the law and that "Mahler's motion to alter or amend judgement is therefore denied...(and) a temporary restraining order is denied s moot" (West's Fed. Supplement, 1583). In other words, the case was over.

Concluding Legal Implications and Public Theory

Although Mahler lost his case against the Forest Service, it did indeed, force the court and the public to scrutinize many of our federal laws regarding forest protection. In fact, the court hinted at the notion of the laws being inadequate themselves. Nonetheless, the case does suggest that the public should begin to understand the process by which, forests are inventoried, and subsequently marked for harvesting. The Forest Service has a conflicting role, for it's

responsibilities lay in both protection management and in the use of the public's national forest. This conflicting role appears to have been created by the vagueness of current laws surrounding forest management.

Because Indiana adopts many of the federal guideline to manage its public land and forests, environmental statues are, perhaps, not as stringent as in other states. No doubt, the sale of timber helps local economies. However, at what cost? If the majority of the public living in the vicinity of the Hoosier National Forest are opposed to timbering on public land, perhaps the Indiana General Assembly should take heed. People testified before the U.S. Congress that the Forest Service was responsive to neither the general public nor the local communities. While new legislation requires public participation when drafting forest management plans, current federal and state law do little to protect our public land from deteriorating.

Government has the role of trustee for the public's land or forests. Although the government attempts to balance the salvage and use of our resources, it has certainly failed with the former. When the public's voice remains unheard, regardless of public participation, the government's ability to act as a guardian is reduced. Unless the public continues to challenge the current laws and statutes regarding public forests on both national and state land, we in affect, permit government to abscond with the public's property. A closer investigation of the Mahler case may provide enough information to re-challenge many of the current legalities behind forest management.

Works Cited

1. Corpus Juris Secundum. St. Paul: West, 1983. A Complete Restatement of the Entire American Law. Ed. Arnold O. Ginnow. 73Avol. St. Paul, MINN, West Publishing Co.
2. Corpus Juris Secundum. St. Paul: West Group, 1998. Annual Pocket Part. 98 vol. St. Paul, MINN.
3. Corpus Juris Secundum. A Complete Restatement of the Entire American Law. Ed. Francis J. Ludes. 98vol. Brooklyn, NY. The American Law Book Co.
4. Unites States Code Annotated: Title 16 Conservation (1151-3100), 1999 Supplementary Pamphlet. West Group. St. Paul, MINN.
5. West's Federal Supplement. 1996, 927 vol. St. Paul, MINN, West Publishing Co.
6. Burn's Indiana Statutes Annotated: Code Edition, Title 14, Ed. Harrison Burns. 1995 vol. Charlottesville, Virginia. Michie Butterworth Law Publishers.
7. West's Indiana Digest 2D: 1998 Cumulative Annual Pocket Part (Witness-Zonning and Planning). 47 vol. St. Paul, MINN, West Group.
8. Ragette, Bill. "Putting the Public into Public Lands." (http://www.wvhighlands.org/surveys.html)
9. Congressional Information Service, INC. (CIS), Congressional Universe. (64 of 72) (http://web.lexis-nexis.com/congcom...5=1cee9f3b5901ed165fe13a98d9e5a4e3)
10. Access Indiana Information Network. **Indiana Code.** (http://www.state.in.us/legislative/ic/98/title14/ar23/)
11. Bloomquist, Robert F. "Turning point: the foundering of environmental law and policy in Indiana?" Indiana Law Review 27, 4 (1994): 1033-1061.
12. Bloomquist, Robert F. "In search of accountability: the legislative re-invention of environmental law and policy in Indiana." Indiana Law Review 27, 4 (1995): 913-957.

13. Carmichael, Jeffery L. "The Indiana Environmental Policy Act: casting a new role for a forgotten statute." Indiana Law Journal 70, 2 (1995): 613-655.

14. United States Cong. Sub. Committee On Natural Resources. Oversight Hearings. 103rd Cong., Second sess. No. 103-66. Washington: GPO, 1995.

15. United States Cong. Sub. Committee On Natural Resources. Hearing: Forest Biodiversity AND ClearCutting Prohibition Act. 103rd Cong., Second sess. No. 103-86. Washington: GPO, 1995.

Conclusion

Conclusion

Although forests have faced a tumultuous history, they remain a valuable resource, and efforts should be made to preserve their environmental and economic contributions to Indiana. Problems arise, however, because ownership is divided among public and private owners with different backgrounds and intentions toward their land, thus causing discontinuity of management across Indiana's forest acreage. Each sector faces different challenges. For example, on state forestlands a shortage of tree nurseries exists and a majority of the public believes timbering should be banned from state forests, although the Division of Forestry adamantly believes that timbering should always be part of its mission. On private lands, no laws regulate private land owners' actions toward timbering, and the public must rely on the private owners' sense of ethics to secure forestland in the future. Other states provide alternative programs that are more effective in inciting people to develop management plans than Indiana's current stewardship programs. When government and private entities fail to manage the forests properly, the public nature of the land is endangered. The State and its citizens are all dependent on the resources that the forests provide, such as economic benefits, promotion of biological diversity, and recreational enjoyment. In a state where 90 percent of the land belongs to private owners, the State and private owners must interact and communicate to ensure sustainable forestry.