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Forest Policy Issues in Indiana

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Forest Policy Issues in Indiana*
by Dennis C. Le Master and Lois E. Rans

The purpose of Forest Policy Issues in Indiana is to provide a brief overview of public policy analysis as well as a summary of leading contemporary policy issues in Indiana relating to forestry.

Forestry is important to Indiana. Its forests are strikingly beautiful, productive in terms of wildlife habitat, and sites for many outdoor recreational activities. Furthermore, these forests support several industries manufacturing wood products: hardwood lumber and veneer at the primary level and wood furniture and cabinets at the secondary level. Together these industries comprise one of the very largest employers in the state.

A public policy problem or issue necessarily precedes a public policy. Policy can be defined as a settled course of action. A policy can be private or public. The kind discussed here is the latter. Hence, a public policy is a settled course of action to be followed by a government body or institution with regard to an issue.

Policy analysis is an applied academic discipline which can be defined as the systematic evaluation of the viability of alternative policies from several perspectives, strategies for implementation, and the consequences of adoption. A seven-step process is often used in conducting policy analysis, specifically:

1. Defining the problem;
2. Establishing evaluation criteria;
3. Identifying alternative policies;
4. Evaluating alternative policies;
5. Selecting the preferred policy;
6. Implementing the preferred policy, and
7. Monitoring and evaluating policy implementation

(Patton and Sawicki)

* The Indiana Society of American Foresters (ISAF) has reviewed this publication and found its coverage of forest policy issues very appropriate for Indiana. ISAF believes the publication is useful in furthering the understanding and involvement of ISAF members and others in the consideration, development and implementation of forest policy.
Rationales for Public Policy

Several rationales for public policy exist, most involving some element of market failure. As presented in contemporary economic texts, market failure occurs when public goods are involved, where externalities exist, in the event of natural monopolies, and under conditions of lack of knowledge by consumers (Barron and Lynch; Stiglitz; Varian). Public goods are goods that cannot be withheld from one individual without withholding them from everyone, like national defense, street lighting, or police protection. Externalities are descriptive of situations in which certain goods or services are produced and sold privately, and some people incur costs for which they are not reimbursed—like someone downstream from a manufacturer who dumps pollutants into a water course—or receive benefits for which they do not have to pay—like someone who builds a home or locates a business near a park offering a scenic vista. Natural monopoly occurs when fixed costs of providing a good are very high relative to variable costs so average cost declines as demand increases. Lack of knowledge refers to situations in which information about a good or service is not available to consumers resulting in them buying either too much or too little.

A rationale for public policy can also exist when public consensus exists about some social goal such as income distribution, education, or aesthetics. For example, public education is not provided in the U.S. because of market failure, but because society feels it is desirable and necessary in a democratic society.

There are limits to government intervention in markets, and they can be called instances of government failure (Weimer and Vining). It has been convincingly shown, for example, that majority voting cannot provide a means of determining collective choices consistently from individual choices and, at the same time, satisfy conditions of rationality. In other words, voters are frequently inconsistent in expressing their collective preferences. Further, significant problems with representative government exist which sometimes lead to government failure such as the disproportionate influence of organized or special interests, the conflict between regional interests and national interests, the short time horizons of elected officials caused by the election process, and the distortion that occurs in public policy debates when politicians posture to news media to gain public attention. Finally, there are bureaucratic organizational problems associated with government including: (1) limitations in time and expertise necessary...
to review and monitor government operations, including how resources are used; (2) lack of competition and its effect on incentives to innovate; (3) difficulty in valuing output of many government services such as national security, law and order, and safety; and (4) inflexibility in personnel administration because of civil service protections and perhaps some affirmative action programs.

The point is neither the market system nor government intervention is the complete answer in the allocation of resources or goods and services. In fact, the best answer to a question of which is better is "it depends." And among those things upon which "it" depends are societal values and goals, the perceived degree of market failure, and the likelihood of success of government intervention.

**Criteria for Evaluating Public Policy**

Several criteria are often used in public policy analysis to evaluate policy alternatives, for example: technical feasibility, economic efficiency, political viability, and administrative operability (Brewer and DeLeon; Dunn; Patton and Sawicki). The five that follow are a version developed by Marion Clawson in the 1970s, which are fairly well known and accepted among forest policy analysts in the U.S. (Clawson).

1. Physical and biological (technical) feasibility: Is the policy physically and biologically (technically) feasible? For example, with regard to forestry, does the policy make biological sense? Would it have the intended effect? Would it adequately address the problem?
2. Economic efficiency: Are the benefits of the policy worth the costs, both tangible and intangible in each case? Has a conscientious effort been made to minimize the unintended consequences in the market?
3. Equity: Who benefits and who loses? Is it fair, applying conventional societal standards?
4. Social acceptability: Is the policy acceptable to society in terms of prevailing social values and goals? To what extent is the policy acceptable to relevant groups in society?
5. Administrative practicality: Does the implementing agency have the authority to carry out the policy? How committed to the policy is the agency? Is it capable of
Table 1. Advantages and Disadvantages of Generic Kinds of Government Intervention

<table>
<thead>
<tr>
<th>Kind</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>General education programs</td>
<td>Voluntary participation; inexpensive</td>
<td>No compliance mechanism; lacks site specificity</td>
</tr>
<tr>
<td>Technical assistance programs</td>
<td>Voluntary participation; provides for site specificity; comparatively inexpensive</td>
<td>No compliance mechanism</td>
</tr>
<tr>
<td>Insurance or “cushioning” programs</td>
<td>Voluntary participation; market responsive; provides investment incentive by reducing risk</td>
<td>No compliance mechanism; modestly expensive</td>
</tr>
<tr>
<td>Regulation</td>
<td>Has compliance mechanism; can provide for site specificity; effective in achieving minimum performance standards</td>
<td>Mandatory; raises production costs of producers; costly to enforce; unresponsive to market forces</td>
</tr>
<tr>
<td>Taxation or subsidization</td>
<td>Participation in subsidy or tax expenditure; programs is voluntary; Market responsive; provides incentives</td>
<td>Taxation approach is involuntary; costly</td>
</tr>
<tr>
<td>Public ownership</td>
<td>Targeted; provides for long time horizons and nonmarket values</td>
<td>Unresponsive to market forces; costly; subject to the vicissitudes of government funding</td>
</tr>
</tbody>
</table>

implementing the policy in terms of staffing, budget, and time? Does the agency have the physical facilities, equipment, and other support services to implement the policy?

Generic Kinds of Government Intervention

Government intervention as a matter of public policy can take several standard forms, specifically:

1. General education programs, e.g., developing and offering educational programs through the cooperative extension service for various groups, such as forest landowners, by offering seminars, workshops, and field tours.

2. Technical assistance programs, e.g., developing and offering direct site-specific technical assistance programs for forest landowners.

3. Insurance or “cushioning” programs, e.g., an insurance program for forest landowners against forest disease epidemics, insect infestations, and fires.

4. Regulation: directing allocation of resources by rules or orders issued by the executive authority of government, having the force of law.

5. Taxation or subsidization: offering financial incentives or favorable tax treatment, e.g., government cost-sharing for tree planting by a private landowner, or financial disincentives such as a tax on overseas shipment of saw logs.

6. Public ownership of resources or production or goods and services: directing allocation of resources by direct government intervention in markets. Government ownership does not have to be complete. Government may acquire only those property rights necessary for its purposes such as the development rights of a tract or the surface rights.

The foregoing forms of government intervention through public policy are not presented in a random order. Instead, they are presented in an order intended to approximate an increasing degree of intervention as well as relative cost. While these may comprise two criteria for evaluating public policy, they are not the only ones as indicated earlier. Set forth in Table 1 is a list of advantages and disadvantages of each form of intervention.
Contemporary Forestry
Issues in Indiana

Nine issues concerning forestry and forest lands in Indiana are the subject of current public interest and debate. They are presented below in alphabetical order in terms of a description of the situation, statement of the problem, and alternative policy solutions. Only seemingly viable generic policy solutions are presented. Other viable policy solutions are presented, those seemingly unique to the problem, when appropriate. Because of limitations in space, the solutions are not presented in detail, but in abbreviated form.

A no-action alternative—doing nothing—is normally included among the alternative policy solutions for any public policy problem, and it should be assumed for each of the policy issues listed below. Generally, selecting the no-action alternative would result in exacerbating the identified problem. On the other hand, the no-action alternative may occasionally compare quite favorably to other proposed solutions when subjected to evaluation criteria such as that described earlier.

Forest Fragmentation

Indiana's natural forests are fragmented due to agricultural, industrial, and urban and suburban development. Timber harvest units, roads, and powerline and pipeline corridors can also breakup forest areas. Forest fragmentation tends to reduce biological diversity, defined as "the variety and abundance of species, their genetic composition, and the communities, ecosystems, and landscapes in which they occur" (Society of American Foresters). Biological diversity is important for economic, ecological, intrinsic, aesthetic, and legal reasons (Roberts et al.).

Public Policy Problem: Indiana forests are fragmented and are in danger of becoming more so, adversely affecting biological diversity of forest flora and fauna in the state.

Public Policy Solutions:
1. **Protect forest lands by zoning.** Forest lands could be zoned so they continue under forest cover. Nevertheless, zoning is a form of regulation and would be strongly objected to by some landowners.
2. **Provide financial incentives to place and maintain land under forest cover.** Financial incentives for land-owners could be used to protect existing forest lands, to increase their size, and to establish forests to lessen the degree of forest fragmentation in the state.
3. **Acquire key forest lands.** Forest lands could be acquired and placed under public ownership to increase the size of existing public forests, to “block up” existing holdings of public forest land, to reduce forest edge—the transition zone between adjacent vegetative communities—on public forest lands, and to provide suitable vegetative corridors between forests, such as along water courses. The challenge, of course, is that land acquisition is expensive. In lieu of acquisition, development rights could be acquired, which would lessen the cost of this approach.

**Interstate 69 Extension from Indianapolis to Evansville**

Renewed interest has developed in extending Interstate 69 from Indianapolis to Evansville. Such a project is supported by business interests in Evansville, the Governor’s Office, the Indiana Department of Commerce, and the Indiana Department of Transportation, among others. It is opposed by several activist groups, including Citizens for Appropriate Rural Roads, Heartwood, the Hoosier Environmental Council, and Protect Our Woods.

The controversy centers primarily around the selection of the route for the extension. Several have been proposed, and three have been actively considered. From a forestry perspective, the issue is the impact of the extension on forests in southwestern Indiana. To what extent would it reduce forest lands in the region? What effect would it have on forest fragmentation? What effect would suburban development along the corridor have on forests and wildlife habitat? To what extent would such development limit forest accessibility for timber harvesting?

**Public Policy Problem:** Extension of Interstate 69 could significantly reduce forest acreage in southeastern Indiana and increase forest fragmentation.

**Public Policy Alternatives:**

1. **Construct the extension on a route that minimizes a reduction in forest acreage.** The problem with developing such a route is that it would likely require converting productive agricultural land into an interstate highway and increase the cost of the extension.

2. **Mitigate the reduction in forest acreage by converting agricultural land into forest land.** The problem with mitigation is that it is costly, and it normally involves a lengthy transition period before its positive effects are realized.
Lack of Resource Data

A survey of the forests of Indiana is sporadically conducted by the federal government with cooperation and participation of the Division of Forestry of the Indiana Department of Natural Resources. The survey is supposed to be conducted every ten years, but indeed the last two surveys were conducted in 1967 and 1986, nineteen years apart. Another forest survey is scheduled for 1996. Survey data are gathered with respect to forest land area, including productivity, forest type, and ownership, and stand-size class distribution, including tree species, diameter distribution, mortality, net growth, and removals.

No data are collected on forest health, and spatial data are inadequate for purposes of making virtually any inferences about forest dynamics across the landscape. Furthermore, no data are routinely collected on the economic aspects of timber such as timber and saw log prices. Finally, data on the wood products industries are lacking other than what periodically appears—about every four of five years—in the Census of Manufacturers which is of little use for making economic development decisions. The frequent claim that the wood products industries is the fourth or fifth largest industry in Indiana is at best an educated guess based on fragmentary and incomplete data.

Other than birds, systematically collected data on forest animals is unavailable.

Public Policy Problem: Reliable information on the forests of Indiana is seriously lacking, especially from the perspectives of forest health and economic development.

Public Policy Solutions:

1. **Continue to conduct or support Forest Service and ad hoc surveys of Indiana forest lands and resources.** The current approach of supporting Forest Service surveys of Indiana forest lands and ad hoc surveys of various kinds can be continued, but it would yield data that is basically inadequate for effective decision making.

2. **Conduct or support comprehensive, systematic surveys of Indiana forest lands and resources.** Developing and implementing a comprehensive, systematic survey of Indiana forest lands and resources, while costly, would provide the necessary basis for effective decision making. Funding for such a survey could come from both federal and state sources as well as the benefiting industries.
Large White-Tailed Deer Populations in State Parks

White-tailed deer have grown in numbers since their reintroduction in the early 1930s, so much so that they have become the dominant wild herbivore in the state in terms of impacts. In some areas of the state, their numbers are problematic in terms of crop damage, hazard to highway traffic, and impacts on forest flora and other fauna. The latter problem is especially acute within state parks which have been closed to hunting.

Public Policy Problem: White-tailed deer populations in several state parks have grown to such numbers that they are having adverse effects on forest flora and other fauna.

Public Policy Alternatives:

1. Trap and transfer. Trapping white-tailed deer and releasing them at another location has been proposed, but it would be very costly as well as stressful to the deer. It also assumes another location is available which may not be the case.

2. Fence state parks. Fencing state parks would also be very costly as well as aesthetically objectionable to many citizens. Furthermore, it would be detrimental to the movement of other species and, hence, objectionable from an ecological perspective.

3. Reintroduce predators. Natural predators such as bears, cougars, lynx, and wolves could be introduced to control white-tailed deer populations, but they likely would not confine their movement to state parks or their food source to white-tailed deer. This method of control would probably not be socially acceptable because of possible harm to humans. Paying for domestic livestock killed by predators would involve serious, continuing administrative problems. Finally, it is arguable whether predators have ever “controlled” the population of a prey species in the conventional sense of the word.

4. Control fertility. Fertility of white-tailed deer herds could be controlled by administering biochemical contraceptive compounds delivered either by injection or through adulterating the food supply of the animals. Administering contraceptives by injection, however, is very time-consuming, expensive, and sometimes dangerous. Adulterating the food supply is less costly, but there is no assurance that only white-tailed deer would ingest the food and, hence, be affected.
5. Allow controlled hunting of white-tailed deer on state parks. Controlled hunting of white-tailed deer would reduce their populations rather inexpensively. On the other hand, some citizens object to the killing of deer. Furthermore, this solution involves a problem in administrative practicality in terms of who can hunt and how many deer may be taken. In fact, controlled hunting is the policy adopted by the Indiana Department of Natural Resources, and it has temporarily reduced the deer population in state parks.

Protection of Urban Trees and Forests

Trees in urban areas in Indiana as well as elsewhere in the United States provide many important benefits, such as improving the aesthetic qualities of urban life, reducing storm water runoff, and reducing building heating and cooling costs. Unfortunately, urban street and ornamental trees are stressed and many are dying from a variety of causes, most of them associated with lack of knowledge on the proper care of trees in urban environments.

Similarly, urban forests are increasingly stressed by the effects of human activities, ranging from air pollutants, such as sulfur dioxide, nitrous oxides, and ozone caused by automobiles, power generation, and manufacturing; development activities; and soil compaction, often the result of poor trail design, maintenance, and use.

Public Policy Problem: Urban street and ornamental trees are being stressed and many are dying primarily because of inadequate growing space, poor soil conditions, poor planting techniques, lack of maintenance, and improper maintenance practices. Furthermore, urban forests are being stressed by pressure from a variety of human activities, both economic and recreational.

Public Policy Solutions:

1. Provide general education programs for adults and children on tree care and how to use and appreciate local forests. Many problems in urban forestry and tree care could be resolved if homeowners were more knowledgeable about tree biology, tree selection, placement, planting techniques, and maintenance. Seminars, short courses, and field tours could be conducted by state agencies, including the cooperative extension service, and often are. More would be better. Further, similar programs could be conducted for children and include components on how to appreciate and use urban forests.
2. Conduct educational and technical assistance programs for developers, building contractors, municipal planners and landscape maintenance crews, and park designers and maintenance crews. The purpose of such programs would be, among other things, to: (1) inform developers and road and building contractors about how to select and protect trees during development and construction activities; (2) assist municipal planners in understanding the spacing and soil requirements of trees, appropriate selection of tree species, and the need for tree care and maintenance; (3) instruct landscape maintenance crews on how to care for urban trees as well as how not to abuse them during routine maintenance activities such as mowing, and (4) assist park designers and maintenance crews in developing trail systems in urban parks and forests.

3. Regulate tree planting, maintenance, and removal in urban areas. Municipalities could enact ordinances that require protection of trees during development and construction projects, that spaces be left for trees in development and construction projects, and that trees of appropriate species be planted in these spaces where none are growing. These ordinances could also set requirements for tree maintenance and removal.

4. Provide financial incentives for developers. Municipalities could provide incentives to developers for keeping and protecting trees of designated species during clearing of residential development projects.

Regulation of Forest Practices

Concern is frequently heard about the quality of forest management in Indiana. To improve it, some have urged enactment of legislation that would regulate forest practices on private forest lands. Many states have such laws, most of them in the West. Their principal purposes are to sustain forest productivity and timber supplies and to meet water quality standards.

Regulation can have positive effects on forest productivity and environmental quality. It can also have negative effects if compliance is too costly in terms of time, effort, and work stoppages, and too restrictive, such as when productive timber management activities are discouraged.

Public Policy Problem: Should forest practices on private lands be regulated to sustain forest productivity and timber supplies and to meet water quality goals?
Public Policy Alternatives:

1. **Conduct landowner educational and technical assistance programs.** Educational and technical assistance programs for forest landowners already exist, but they could be augmented. Their premise is that if landowners are knowledgeable about forest management, they would apply the knowledge, raising the level of management on their lands. The challenges to this premise are, first, only a small proportion of forest landowners participate in educational and technical assistance programs, and second, no actual incentives exist for the landowners to apply the knowledge they have acquired.

2. **Develop and use best management practices (BMPs).** In lieu of regulation of forest practices, many states, particularly in the South, have adopted BMPs as a way of achieving their water quality goals. BMPs can be defined as a practice or combination of practices determined to be the most effective, practicable means of managing forest lands for a variety of purposes, including timber production. Voluntary compliance with BMPs by a landowner or operator normally exempts the land from state regulatory action or provides the landowner with favorable treatment of some kind by the state. However, no regulation of forest practices exists in Indiana for any reason, and no means of providing favorable treatment for forest landowners by the state for voluntary compliance with BMPs is currently in place. So the incentive for compliance would be small. Further, while at least one group is working on developing BMPs, the fact is they are not yet operational or recognized in any official way.

3. **Enact a state forest practices act.** A state forest practices act could be enacted which would regulate management activities on private lands. Since there is considerable experience in the design, content, and implementation of state forest practices acts, it would be a relatively simple matter to prepare one for consideration by the State Assembly. Nevertheless, regulation of forest practices is very costly to implement. Further, government regulation is opposed philosophically by some, being considered an infringement upon their property rights. Finally, experience indicates that while regulation is reasonably successful in achieving a minimum standard of performance, it is not successful in achieving much beyond the minimum.
4. Provide financial incentives to forest landowners to improve management on their lands. If it is desirable to raise the level of management on private forest lands in Indiana, the most direct way is by providing forest landowners with a financial incentive for doing so. The cost of such a program would be substantial, however, and would have to compete with other programs for public funds or favorable tax treatment.

Riparian Zone Protection and Management

Riparian zones are the vegetated areas on the banks of rivers and streams which act as filtering mechanisms, serving to maintain water quality. They are important for erosion control. They also provide fish and wildlife habitat, providing cover, food, and travel corridors. The importance of riparian zones has not been well understood in the past, and the result is they have been degraded or even eliminated in some areas, with the inevitable consequence of accelerated soil erosion and reduced water quality.

Public Policy Problem: Riparian zones are generally degraded in Indiana, reducing water quality, fish and wildlife habitat, and associated human recreational activities.

Public Policy Alternatives:

1. Develop and implement landowner education and technical assistance programs. Landowner education and technical assistance programs could be developed and implemented with regard to riparian zone protection, management, and rehabilitation. While such a program would be comparatively inexpensive, it would provide little incentive for a landowner to protect and manage riparian zones on his or her property, much less rehabilitate them.

2. Regulate human activity in riparian zones. Regulation of human activity in riparian zones could achieve a minimum standard of protection. It would be costly to administer, however. An important issue would be what level of government could most effectively regulate riparian zone protection. Riparian zones shared by two or more states would be best regulated by the federal government, while those involving only one state would be best regulated by state government. Where a riparian zone begins and ends would be an important administrative problem which would have to be addressed as well as federal-state coordination of regulatory activities.
3. **Provide financial incentives.** Financial incentives for landowners could be used for riparian zone protection, management, and rehabilitation. Landowners who would engage in such activities would receive financial assistance. The problem with all such programs is cost. Further, some might object to giving financial incentives for riparian zone protection with tax revenues, arguing that the public should not pay for something the landowner has the responsibility to do.

4. **Acquire key riparian zones.** Public ownership of key riparian zones would ostensibly insure their protection. The cost of acquisition would be problematic, however, as would the cost of maintenance.

**Shrinking of the Forest**

**Land Base in Indiana:**

At the time of European settlement of Indiana, 87 percent of the state was forested. The forest was cleared, except for scattered remnants on comparatively unproductive land, for purposes of development and farming. Forest clearing probably reached its peak by 1930. Many marginal farms were abandoned during the Great Depression, and many wooded pastures and improved pastures reverted back to forest. In 1967, there were 4.0 million acres of forest land in the state. Today, there are an estimated 4.4 million acres of forest land in Indiana, 16.6 percent of the land base.

While forest acreage in the state has increased, accessibility for timber harvesting is another matter. Many forest lands have been developed in the sense they have become sites for recreational homes and are, hence, inaccessible for timber harvesting. Increasing urban and suburban expansion also tends to work against the accessibility of forest land for timber harvesting. On the other hand, many lands that are accessible for timber harvesting have been poorly managed and contain low quality timber.

**Public Policy Problem:** The forest land base accessible for timber harvesting and containing quality timber is shrinking.

**Public Policy Alternatives:**

1. **Develop and implement forest management best management practices.** BMPs have been developed in various states primarily as a means of meeting water quality standards developed under provisions of the Federal Water Pollution Control Act Amendments of 1972. BMPs can also be developed as means of achieving a
variety of forest management standards. Voluntary compliance with BMPs by a landowner or operator normally exempts the land from state regulation of forestry practices, or provides for some favorable treatment by the state. As mentioned above, no such regulation and no means of providing favorable treatment exists in Indiana, however, so the incentive for compliance would be small.

2. **Regulate forest practices.** State regulation of forestry practices is effective in establishing minimum standards of forest management. Zoning, a form of regulation, could be used to insure that forest lands are not converted to some other use, that they are maintained in forest cover.

3. **Subsidize through cost sharing or favorable tax treatment.** Subsidization through cost sharing or favorable tax treatment of expenses associated with reforestation or timber stand improvement can bring about a significant improvement in forest management. It has been successful in several states and, to some extent, at the national level. Unfortunately, such a program is also costly to implement and administer.

**Wetlands**

Wetland ecosystems are very productive in terms of both the abundance and diversity of plant and animal life. They also have the capacity to remove pollutants, control sediment, reduce flooding, recharge aquifers, and recycle nutrients. Less than half of the 200 million acres of wetlands that existed in the continental United States at the time of European settlement remain. Draining and filling wetlands for agricultural and developmental purposes have been the main causes of wetland loss in the past.

The principal federal law that regulates wetland use is section 404 of the Federal Water Pollution Control Act Amendments of 1972, which regulates the filling and dredging of U.S. waters. More recent legislation designed to protect wetlands includes the “swampbuster” provision of the 1985 Food Security Act, which eliminated federal farm subsidies to farmers who grow crops on agricultural land converted from wetlands after 1985. The 1990 Farm Bill amended the “swampbuster” provision to change the timing of a swampbuster violation, from the time of planting on a filled wetland to the time of draining for agricultural purposes.

Current debate on wetlands has been on the definition for purposes of section 404. In 1989, the Environmental Protection Agency and the Army Corps of
Engineers, among others, published the "Federal Manual for Identifying and Delineating Jurisdictional Wetlands," which was met with much criticism for being too far-reaching. Implementation of the definition in the 1989 Manual was prohibited in a provision of the Energy and Water Development Appropriations Act of 1991. This compelled the Corps of Engineers to use the definition of wetlands contained in its 1987 manual titled "Wetlands Delineation Manual" (U.S. Corps of Engineers). A subsequent attempt to revise the 1989 manual in 1991 was also rejected. The issue continues at an impasse. In the meantime, use continues of the definition in the 1987 Manual, which considers soil type, vegetation type, and saturation periods. A study of wetlands delineation by the National Academy of Sciences was authorized, completed, and is under review at the time of writing. It will be used by Congress and implementing federal agencies, ostensibly at least, in developing a new definition.

**Public Policy Problem:** Protection of wetlands is at an impasse because of the inability of federal agencies, Congress, and prominent interest groups to agree on an operational definition of wetlands for purposes of implementation of section 404 of the Federal Water Pollution Control Act Amendments of 1972.

**Public Policy Solutions:**

1. **Delineate wetlands through administrative rule-making.** The agencies with responsibility for implementation of the Federal Water Pollution Control Act Amendments of 1972 could delineate wetlands through the Administrative Procedure Act. The challenge, of course, is the power of the respective interest groups involved and their influence on members of Congress. Regulation of wetlands is viewed as a taking issue by those groups who are developmentally oriented, and they are demanding compensation for landowners for their perceived economic losses.

2. **Delineate wetlands through statute.** Congress could delineate wetlands by statutory means, but it would force a major public policy debate on property rights and the taking issue which many members of Congress want to avoid.
Combining Issues and Policy Solutions

While the foregoing issues have been presented as being separate, distinct, and unconnected, obviously they are not. For example, forest fragmentation, the extension of Interstate 69 to Evansville, and the shrinking of the forest land base in Indiana are very much related to one another.

Similarly, the generic solutions have been presented as if they are separate, distinct, and unconnected. But they can be and usually are combined in addressing a public policy problem. For example, general education programs, landowner technical assistance programs, and regulation are usually combined in a comprehensive program to improve forest practices.

If the citizens and public policy decision makers of Indiana want to address the forest policy issues facing the state, a comprehensive approach is recommended as is concerted application of various forms of government intervention.

Conclusion

There are several public policy issues in Indiana relating to forestry. Effective solutions require that the issue be well defined, that appropriate evaluation criteria be developed, that alternative solutions be identified and evaluated, and finally, that one of these solutions be selected and implemented. Inevitably, choices have to be made, and they should be made on the basis of systematic use of evaluation criteria. No policy solution is without its cost. Indeed, cost alone is not sufficient in evaluating a policy. It has to be considered along with the benefits that would be yielded. Even more important, the policy solution must support and be consistent with prevailing social values and goals.

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