
Complexity, Wickedness, and Public Forests



"We use the term 'wicked' in a meaning akin to that of 'malignant' (in contrast to 'benign') or 'vicious' (like a circle) or 'tricky' (like a leprechaun) or 'aggressive' (like a lion, in contrast to the docility of a lamb). We do not mean to imply malicious intent."

H.W.J. Rittel and M.M. Webber, 1973

By Gerald M. Allen and Ernest M. Gould, Jr.

Public forestry is taking the direction of the engineering sciences. Demands are being met for more and more data on the biophysical intricacies of forest systems. Increasingly complicated mathematical models project forest growth and yield under intensive management practices, and tremendous amounts of energy are being thrust into economic optimization models. The physical sciences are shaping strategies to manage public forest resources. Systems analysis is

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being used in problem-solving, based on scientific rationality and the assumption that more information on a phenomenon automatically leads to better management. This may be true for a physical or isolated biological system; however, public forestry is by no means limited to the physical or biological sciences. The forestry community is confusing complexity with wickedness.

Complexity

Foresters are comfortable dealing with complexity. Forests are biologically complex. Interactions of soil, microorganisms, plants, animals, and people are tangled and difficult to understand. Tools used by the forest manager are also complicated. A large

skyline logging system is complex. The workings of the interlock system, the tensions on each line at a given terrain point, and optimum economic operating conditions are all difficult to grasp and calculate. Yet finding out how to operate in these situations is a tractable problem. Traditional analytic models can be used with systems that follow physical, biological, and market principles. If I pull on this line so much, an additional amount of tension will occur at that point in a predictable, rational, unerring way. All I need are the equations.

Many problems in forestry lend themselves to systems analysis. However, most occur in tactical operations rather than in strategic planning. Finding the most economically efficient method of constructing a road system

in a given watershed may require a complicated analysis, but the optimum solution is obtainable. Likewise, determining the most productive rotation length for a stand or the best equipment-replacement strategy for a given future scenario are decisions that, although potentially complex in structure, definitely have right or wrong answers.

The efficient road system is only relevant, however, after a decision has been made that it is appropriate to build a road in that particular drainage. Similarly, optimum rotation means nothing unless timber harvesting is desired for that stand. Strategic planning forms the policy of an organization and tends to address issues where the answers come in the form of goods and bads rather than rights and wrongs. Such

planning is certainly complex, but it is also wicked.

Wickedness

Wicked problems share characteristics. Each can be considered as simply a symptom of some higher problem. Selecting a silvicultural regime, for instance, may be seen as a function of growing timber, or the need for sawmill jobs, or visual amenity, or regional development, or some combination of these. The definition is in the mind of the beholder, and how that person chooses to explain the problem determines the scope of the search for a resolution. Furthermore, there is no single correct formulation for a wicked problem, only more or less useful ones.

Each wicked problem concerns an assemblage of resources combined with effective demands in ways that are unique in time and space. Consequently, any solution developed is a one-shot operation with little or no chance to learn by direct trial and error. We also cannot know when all possible solutions have been explored, because there is no stopping rule.

Solutions are generally good or bad rather than true or false; their validity cannot be tested objectively. Further, each wicked problem is extremely important and each solution significant. The decision-maker cannot be wrong, even occasionally, and so must choose solutions after agonizing appraisal.

Wicked problems are the ones that do not necessarily deal with systems where inputs, outputs, and intermediate actions or reactions occur in a scientifically predictable manner. Consider the classic example of Bernhard Fernow's program of clearcutting and planting in the Adirondacks. All reason and scientific evidence indicated this as the most efficient, rational decision to upgrade forest production. Fernow's error was not in his analysis of the silvics of the situation. Rather, he did not see his threat to the amenity that made the Adirondacks so dear to his neighbors—so dear that they would organize to stop his entire forestry program. Even

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if recognized, this wicked amenity problem could not have been explicated by traditional, efficiency-oriented, innocent methodologies.

Innocent problems, like people, can become wicked quickly. Note the consequences of shifting from selection cutting to clearcutting in order to rehabilitate high-graded hardwood stands on the Monongahela National Forest (WV). The improved regeneration appeared right on schedule but was cold comfort in light of the adverse effect that clearcutting had on other forest values, public relations, and eventually the legal climate for forestry in the entire federal establishment. A seemingly innocent local problem precipitated the wicked problem of a multilayered power struggle to determine who had a legitimate role in planning the use of national forests.

Public Forests

One need not look too closely at characteristics of wicked problems before it becomes apparent that strategic planning, particularly on multiple-use public forests, is definitely a political problem of wicked proportions. Why does the Forest Service replan so frequently? Because there is no stopping rule. How do forest supervisors know whether they have a good plan or not? They don't. They have no immediate or ultimate way to test the plan except to

see if it attracts a working consensus of clients, bureaucrats, and politicians. Why must every forest develop its own management plan? Because each forest and each consensus is essentially a planning situation unique to that time. If the judgmental trade-offs of the Multiple Use-Sustained Yield Act of 1960 did anything, they perpetuated the wickedness of long-term management planning on national forests.

The federal government is in a quandary, dealing with an inherently wicked problem. In 1976, Congress set standards and outlined a process for seeking solutions in the National Forest Management Act. The regulations drawn up by the USDA Forest Service to implement that act took the modern approach of the management scientist—collect more data, build bigger models, crunch more numbers, put more energy into the system, and surely the right answer would be forthcoming. True for innocent problems but possibly a loose cannon for wicked ones.

The procedures and methodologies called for in the regulations are witness to the naive hope that science can eliminate politics. These directives stress numerical analysis, economic efficiency, and scientific rationality as the road to better long-term management of our national forest system. They mirror traditional problem-solving attitudes designed for complexity, not wickedness. A planner dealing with wicked problems, however, uses models to find out “What will happen if I do this? Or this? Or this?” before even a hazy outline of the problem is revealed. Such free-wheeling exploration calls for thoughtful analyses, which when making use of conventional algorithms are likely to do so in unconventional ways.

In 1980, Nadler argued that using schemes designed to answer innocent questions is a weak approach to public planning. He found such an approach counterproductive because “it seeks measures for measurement's sake, restricts creativity, wastes professional resources, and generates defensiveness in people. Inward-looking, the research

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approach's conventional methods are elitist through reliance on experts and emphasis on analytical techniques." This may be especially true in forestry, where the wicked problems tend to be legitimate political questions.

In *Search of Excellence*, the recent best seller by Peters and Waterman, finds that surviving and prospering in a highly competitive American business environment—truly a wicked problem—is not primarily dependent on sophisticated equipment, state-of-the-art technology, or meticulous, long-range planning so much as it is on other characteristics of the firm. Technology and analysis are essential at the tactical level, but the overall strategy, direction, and ultimate success of the firm is determined by soft policy decisions. Can such tenets as management by wandering around, family feelings, ready-fire-aim, or razzle-dazzle weekly award ceremonies stand the test of traditional scientific management? Probably not, yet these are the strategic solutions developed by some of America's most successful businesses. Wicked problems require nontraditional solutions.

Multiple-use forest planning cannot use simple extensions of innocent strategies. Bigger, faster, more complex may just not work, and something quite different may be required. In 1978, Howitt hypothesized that simpler models might be advantageous in cases where the problems are at the highest level of abstraction, complexity (uncertainty), and potential importance. Analytic models will continue to contribute to tactical management—they handle short-term, quantified situations nicely. However, long-range forest plans involve power struggles, imprecise goals, fuzzy equity questions, and nebulous information and thus become wicked. Innovative solutions will be required.

The Forest Service will soon complete an unprecedented planning program on the national forests. The amount of time and money expended on this exercise is staggering. We have yet to find anyone who will take even a wild

guess at the absolute amount. Has it been worth it? Will better forest management now occur on our nation's wildlands? Will the wants and desires of the people of the United States be better served for this effort? Could a better job have been done? Who knows! Solutions to wicked problems are difficult to evaluate, remember.

Did wickedness get confused with complexity when the Forest Service selected a planning strategy? In our opinion, the answer is yes, and it is time we face the situation and investigate alternative procedures to do better next time around. Planning methods that successfully interface politics, science, and analysis cannot be standardized. Recent literature on new-age management suggests that such strategies tend to be organization-specific. However, certain characteristics appear common among organizations that have handled the wicked planning game successfully.

Big stinks—Large centralized planning simply does not work (note Soviet agriculture). In addition, agreements are easier come by if the problems are kept small. RARE II, which was national in scope, failed, whereas state wilderness legislation is succeeding. At present, national forest plans propose a schedule of operations for a whole forest over the next half century. This commitment to a global master plan

goes everyone's ox and mobilizes widespread opposition. Consensus might come easier if we practiced incremental planning and were content with correcting problems with the present plan as they are perceived, and while they are still manageable.

Strategic thinking outweighs strategic planning—If line officers think strategically, they can deal effectively with wicked situations as they arise. Science and analysis are of secondary assistance to politics when it comes to public decision-making. Wicked problems are almost never successfully solved by selecting the rationally best solution but more often by choosing the emotionally satisfying one.

People are the key—People are what make problems wicked, and people are the ones who can solve them. Emphasis on people within the organization and on external customers is the central element when wicked problems are successfully handled.

It is time to go back to the National Forest Management Act and search closely among its directives. A new set of interpretive regulations to unleash and upgrade the talents of forest managers to do incremental planning will be possible, once we recognize the distinction between wicked and innocent problems. ■

Suggested Reading

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