

# Use of sociological data in the allocation of common property resources

## A comparison of practices

**Peter Fricke**

**This article compares the resource planning practices of the US Forest Service and the National Marine Fisheries Service. To attain the best use of a resource, managers must balance the elements of resource ecology, economics and social impacts in their decision making. After describing the US legislative mandates on the allocation of common property resources, the author discusses the problems of incorporating sociological information and social impact analyses, and shows that there must be full agreement on the use of knowledge included in the decision-making process. He maintains that the Forest Service has been able to accommodate the legislative requirements that planning be done by interdisciplinary teams and incorporate social impact analyses, while the Fisheries Service has not.**

**Keywords:** Marine resources; Ecology; Fisheries

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<sup>1</sup>Emile Durkheim, *The Division of Labor in Society*, The Free Press, Glencoe, New York, 1964.

<sup>2</sup>E. A. Keen, 'Common property in fisher-  
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Access to land and water resources was once an accepted right for all inhabitants of a geographic area. These common property rights have eroded with time and with the changing values of societies. On the one hand, industrialization and the increasing division and specialization of labour have diminished the need for reliance of individuals upon common property resources for sustenance, while increasing the need to use land and water resources efficiently to support society as a whole.<sup>1,2</sup> On the other hand, without restriction of access indiscriminate use of resources would soon deplete the forests of timber and game and the rivers of fish.<sup>3,4</sup>

The use of public lands for grazing, extraction of timber and hunting was open to all US citizens until the mid-19th century, and free access to the ocean fisheries until 1977. Recognition of the diminution of the resource base caused Congress to act to conserve the nation's natural resources, and the philosophy behind this action can best be summed up in a remark of Theodore Roosevelt:

The Nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased and not impaired in value.<sup>5</sup>

However, this philosophy did not imply that the public lands and fisheries should be preserved as museum pieces or used, for profit or pleasure, by only a privileged few. In intervening and placing the resources of the public lands and oceans in 'public trust', the Congress viewed the role of federal agencies to be one of manager and conservator. Gifford Pinchot defined this role for the US Forest Service as follows:

Natural resources must be developed and preserved for the benefit of the many, and not merely for the profit of the few.<sup>6</sup>

Recent elaboration of the philosophy and policies behind federal management of national forests and ocean fisheries was provided by Congress in the Multiple-Use Sustained Yield Act, 1960; the National Environmental Policy Act (NEPA), 1969; the Forest and Rangeland Renewable Resources Planning Act, 1974; the National Forest Management Act (NFMA), 1976; the Federal Land Policy and Management Act, 1976; and the Magnuson Fishery Conservation and Management Act (Magnuson Act), 1976. For the purposes of this paper, the legislative mandates will be considered to be NEPA, NFMA and the Magnuson Act, although it should be understood that the legislation and Congressional purposes have evolved over time and that each legislative step has built upon the previous ones. In allocation of natural resources for the 'benefit of the nation', NEPA, NFMA and the Magnuson Act require the federal agencies to be concerned with the environmental (biological/ecological), fiscal and social impacts of their regulatory actions. Management of these resources should be, at least, for gains in resource productivity with the minimum adverse impacts on users.

Thus, in order to attain the best use of a resource, federal agencies are required to balance three elements in management decision. These elements – resource ecology, economics and social impacts – differ in ease of definition, measurement and acceptance by resource managers. The thrust of this paper is that the perceived usefulness of social impact analysis affects the incorporation of sociological factors by resource managers when making allocation decisions. In particular, attention will be paid to the use of sociological information in management plans and whether this use can be improved.

The US Forest Service and the National Marine Fisheries Service have been singled out for study because they both manage resources which were formerly considered to be common property. Timber and fishery resources are both renewable over time, and thus require dynamic patterns of management. Both agencies have traditionally been oriented towards the biological management of resources, and towards promotion of the use of these resources for industrial and commercial purposes. In consequence, the organizational structures of the agencies are similar. Other points of similarity are their legislative mandates, administrative rules for managing the resources, and problems of adaptation of the agency to accommodate patterns of multiple use by varied constituencies. Each agency has incorporated economic analysis in its planning in the last two decades, and sociological analysis since 1976.

Differences between the agencies lie in the experience of resource management; the Forest Service has managed forests for some 80 years, while the Fisheries Service has managed marine fisheries for seven years. In addition the Forest Service prepares, reviews and implements forest plans internally, whilst the Fisheries Service reviews and implements plans prepared by semi-autonomous regional fishery management councils. A further difference is that the Forest Service has physical control over its land and timber, while the Fisheries Service manages a resource that is difficult to count, let alone control. Finally, the Forest Service manages only a portion of the timber stands in the USA, and thus the wood products industry is not entirely dependent upon federally grown timber. In contrast, the Fisheries Service, in conjunction with the fishery management councils, is responsible for the

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ies: is sole ownership an option?' *Marine Policy*, Vol 7, No 3, 1983, pp 197–211.

<sup>3</sup>Hugo Grotius, *Mare Librum* (Translation used was provided to UN Law of the Sea Conference Delegates in Caracas, Venezuela, in 1973; mimeo.) 1609.

<sup>4</sup>Garrett J. Hardin, 'The tragedy of the commons', *Science*, Vol 162, 1968, pp 1243–1248.

<sup>5</sup>Address to the North American Conservation Congress, Washington, DC, 1909.

<sup>6</sup>Gifford Pinchot, *The Fight for Conservation*, Doubleday, New York, 1910, p 46.

management of all the marine fishery resources of the fishery conservation zone (FCZ)<sup>7</sup> with the exception of tuna, and thus its management actions are of vital importance to commercial and recreational fishermen.

### **Potential for the use of social impact analysis**

It has been noted that systematic social impact analysis provides information on the scope and effect of changes (and proposed changes) in the human environment, establishes a basis for the mitigation of community impacts, or provides a factual basis for modifying a proposal to conform more closely to human and resource needs.<sup>8,9</sup> The importance of social science information to the resource manager is in determining allocations of resources, in avoiding conflicts over resources, and in effective management of the resources.

The allocation of resources between groups of users, eg commercial and recreational fishermen, or loggers and bird-watchers, requires the management of users and thus involves considerations of equity and social value. Given that the resources were common property before government management, access to them is considered by many to be a right which the agency should ensure. The use of the same fish stock by recreational and commercial fishermen can soon reduce the stock in size, and the agency is faced with the problem of allocation between fishermen who rely on the resource for their livelihood and those who use it for their pleasure. Equity in allocation, recognizing that there must be limits on overfishing, could be determined in terms of the minimum catches by commercial fishermen necessary for them to continue their occupation and a bag limit on recreational fishermen sufficient to provide them with their sport. However, this simplistic solution must be grounded in data on employment and employment opportunities in the fishing communities, the structure of the commercial fishery, and the social value of the fishery to its participants and their communities. Similarly information on the recreational fishery is needed; how many take part, the social context of their participation, and their valuation of the species in question.

The social values involved are questions of life-style. Capture of fish may be part of a recreational activity which refreshes the psyche, or a leisure activity to provide needed protein at a minimum cost. Alternatively, the social values of commercial fishermen as owners and operators of their own businesses, living and working in preferred environments, are embedded in their communities' cultures. Displacement of these values involves not just the social costs of personal change, but a questioning of societal values such as those embodied in the popular concept of 'the American dream'. Similarly, bird-watching is a recreational activity which enhances the lives of participants, but allocation of woodlands solely for this activity would interfere with the activities of others dependent upon the forests for their livelihoods or other recreational pursuits. The description and assessment of social values is part of social impact analysis.

Resource management involves the wise use and conservation of the resource. Wise use embraces not only allocations between groups, but the avoidance of conflicts between them. Nature allocates niches of the ecosystem between animals and birds, thereby reducing overt conflicts. Thus the white tern, the black noddy tern and Audubon's shearwater

<sup>7</sup>The fishery conservation zone extends seawards from the outer limit of the territorial sea to 200 miles from shore. Management of marine fisheries in the territorial sea is carried out cooperatively by NMFS and the states.

<sup>8</sup>Arnold G. Holden, 'Social science practice in government resource agencies', in Maurice E. Voland and William A. Fleischman, eds, *Sociology and Social Impact Analysis in Federal Natural Resource Management Agencies*, US Department of Agriculture, US Forest Service, Washington, DC, 1983, pp 2-10.

<sup>9</sup>Hobson Bryan and John C. Hendee, 'Social impact analysis in US Forest Service decisions', in Maurice E. Voland and William A. Fleischman, eds, *Sociology and Social Impact Analysis in Federal Natural Resource Management Agencies*, US Department of Agriculture, US Forest Service, Washington, DC, 1983, pp 23-46.

use the same fishery ecosystem of Micronesia in different ways and are able to share effectively.<sup>10</sup> Allocation of niches between human users of forest and marine fishery resources is also possible, and here ethnographic information on traditional harvesting areas and methods, seasonality of employment and community dependence upon the resource can provide the manager with information which can enable assessments of the importance of the particular activity to the groups involved to be made, and tailor management measures to fit local customs and expectations. This has the advantage of increasing the probability of compliance with allocation rules.

Finally, sociological information is important in the management of the resource after management measures have been instituted. Continued monitoring for social impacts, and the evaluation of management measures over time, enables the manager to correct any dysfunctions in the management scheme as opportunity arises. Significantly, evaluation of impacts can quickly alert managers to displacement of resource utilization efforts to other areas or species, and thus to unintended impacts upon other groups of users. In management of complex resource systems it is possible for an action designed to decrease use of one resource to increase pressure on others, eg the substitution of bluefish angling for striped bass fishing. Knowledge of such displacement of effort provides the manager with information before the alternate resource is overutilized.

These three uses of sociological data by managers are complementary to the usage of ecological and economic information, and are not substitutes or surrogates for the other information. The manager, in choosing optimum yield strategies, is able to balance the benefits and costs described by the three sets of information and meet the requirements of the legislative mandates in a more precise manner. The ways in which agencies currently use sociological information in natural resource management planning will be described in the next section of this article, and then followed by an analysis of the patterns of use of social impact assessments.

### **Incorporation of social science factors in resource planning**

Congress, when it passed the National Environmental Policy Act (NEPA), stressed that:

‘. . . it is the continuing policy of the Federal Government . . . to use all practicable means and measures . . . in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations of Americans.’<sup>11</sup>

To ensure that this policy was achieved, Congress directed that all federal agencies should:

(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and decisionmaking which may have an impact on man's environment;

(B) identify and develop methods and procedures . . . which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations.<sup>12</sup>

<sup>10</sup>R. Johannes, *Words of the Lagoon*, University of California Press, Berkeley, 1981, p 62.

<sup>11</sup>42 USC 4321.

<sup>12</sup>42 USC 4332.

Thus, the charge given to federal agencies by Congress in NEPA is quite clear (see Table 1). Sociological factors must be integrated into natural resource planning in a systematic, interdisciplinary way, and sociological information about environmental amenities and values must be considered together with economic and technical information.

The Magnuson Fishery Conservation and Management Act<sup>13</sup> of 1976 and the National Forest Management Act, also of 1976, provide the most recent sets of legislative mandates. The acts implement the Congressional directive in NEPA that legislation, and ensuing regulations, incorporate the policies of NEPA outlined above. The implementing regulations for the NFMA state this formally:

The regulations . . . set forth a process for developing, adopting and revising land and resource management plans for the National Forest System. The purpose of the planning process is to meet the requirements of [the NFMA], including procedures under the [NEPA] for assessing economic, social and environmental impacts.<sup>14</sup>

The NFMA regulations then go on to describe the ways in which social and cultural issues should be incorporated in a systematic, interdisciplinary way into forest resource planning.<sup>15</sup>

The Magnuson Act also conforms to the policies defined in NEPA. It provides for the promotion, under sound conservation and management principles, of domestic commercial and recreational fishing and sets forth seven national standards for the preparation and implementation of fishery management plans 'which will achieve and maintain, on a continuing basis, the optimum yield from each fishery'.<sup>16</sup> In setting up the regional fishery management councils 'to prepare, monitor and revise' fishery management plans, Congress required the councils to involve the states and all interested parties in the planning process, and to 'take into account the social and economic needs of the States'.<sup>17</sup> Further, Congress was concerned that fishery management plans should be based upon 'the best scientific information available'<sup>18</sup> and thus the

<sup>13</sup>The Magnuson Act was originally the Fishery Conservation and Management Act; it was renamed in 1981 in honour of Senator Warren Magnuson, its principal architect. The Act was amended in 1981 and 1983.

<sup>14</sup>36 CFR 219.1(a).

<sup>15</sup>36 CFR 219.1(b).

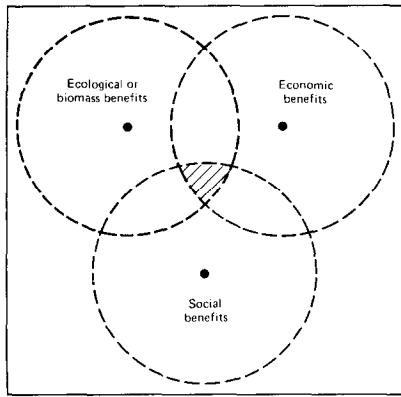
<sup>16</sup>16 USC 1801.

<sup>17</sup>*Ibid.*

<sup>18</sup>*Ibid.*

**Table 1. Analysis of legislative mandates.**

<b>Fisheries Service</b>	<b>Forest Service</b>
<b>NEPA</b>	<b>NEPA</b>
1. Provides for social, economic and ecological analysis in planning	1. As for Fisheries Service
2. Requires federal agencies to conform rules to NEPA	2. As for Fisheries Service
3. Requires federal agencies to consider long-term benefits to nation in planning	3. As for Fisheries Service
4. Requires interdisciplinary planning	4. As for Fisheries Service
5. Social (amenity) values must be used in planning	5. As for Fisheries Service
<b>Magnuson Act</b>	<b>NFMA</b>
1. Defines 'optimum yield' as MSY modified by ecological, economic and sociological factors	1. Requires planning to allocate resources on the basis of MSY modified by economic and sociological factors
2. Requires planning to meet optimum yield criteria	2. Requires planning to consider all user groups
3. Requires planning to be for long-range benefits	3. Requires planning to be for long-range benefits to the nation
4. Requires interdisciplinary planning	4. Requires interdisciplinary planning
5. Sets seven national standards to which plans must conform	5. Sets NEPA standards for planning procedures



● indicates the point of maximum sustainable yield or benefits in this ideal situation.  
 ■ indicates the area of optimum yield or benefits

**Figure 1.** The elements of MSY and optimum yield.

*Note:* This form of representation of these elements was suggested by Ben Wisner and Clem Brititzer.

Magnuson Act is consistent with NEPA requirements for the use of all practicable means to improve and coordinate federal planning.

Maximum sustainable yield (MSY), or the harvest that could be taken without long-term impacts upon the size and health of the resource, had been used by fishery managers as a means of stock assessment and conservation in the development of quotas for fisheries managed by international fishery commissions. Congress, in drafting the Magnuson Act, wished to mitigate any adverse social and economic impacts from fishery management measures.<sup>19</sup> To this end, Congress defined 'optimum yield' as:

the amount of fish

(A) which will provide the greatest overall benefit to the Nation, with particular reference to food production and recreational opportunities; and

(B) which is prescribed as such on the basis of the maximum sustainable yield . . . as modified by any relevant economic, social or ecological factor.<sup>20</sup>

Thus, in the short term, the optimum yield could be set lower than MSY if the goal was to rebuild depleted resources quickly, or optimum yield could be higher than MSY for short periods if this reduced the social or economic impacts of fishery management actions upon users (see Figure 1).

In summary, the NFMA and Magnuson Acts require, in conformity with the policies enunciated in NEPA, that resource planning must consider ecological, economic and sociological factors. These factors must be considered in interdisciplinary planning which must use the best available scientific information.

The two agencies, the Forest Service and Fisheries Service, have taken steps to achieve these goals. The Forest Service recruited social scientists and assigned them to regional and forest supervisors' offices in the National Forest System, and established a post of social science coordinator in the National Office in Washington, DC. It is now (1984) estimated that there are about a dozen professional sociologists and cultural anthropologists employed by the National Forest System, and another dozen who have had extensive social science training.<sup>21</sup> The Forest Service implemented the interdisciplinary planning team approach in 1977, using social science assistance from universities and contractors when qualified Forest Service personnel were not available. The Forest Service also began preparing a series of sociological data baseline studies in 1977 and has continued them since. A series of social impact assessment workshops and training sessions were held for Forest Service managers and senior personnel in 1978 and 1980. Draft Social Analysis Guidance papers were issued in 1981, which have been revised after review at all levels in the Forest Service and were circulated in September, 1983, for inclusion as a chapter in the Forest Service Handbook.<sup>22</sup> This chapter of the handbook implements the directives contained in the Forest Service Manual<sup>23</sup> which deal with the inclusion and use of sociological material in forest management plans.

The focus of the Forest Service's actions are the environmental assessments (EA) and environmental impact statements (EIS) required by the regulations implementing NEPA. The current practice is for sociologists to be employed in the 'scoping', ie determination of necessity and scope of analysis, for a forest management plan by the interdisciplinary team; in collecting and interpreting data for the EA

<sup>19</sup>US Senate Committee on Commerce, *A Legislative History of the Fishery Conservation and Management Act of 1976*, US Government Printing Office, Washington, DC, 1976, p 208.

<sup>20</sup>16 USC 1802.

<sup>21</sup>Personal communication from Dr Lambert N. Wenner, Sociologist, US Forest Service.

<sup>22</sup>FSH 1909.7.

<sup>23</sup>FSM 1973 and 1950.

and EIS; in formulating alternative management strategies for consideration in the EIS and estimating the impacts of these alternatives; and in monitoring programme implementation. In considering social impacts the Forest Service requires the following points to be covered.<sup>24</sup>

- categories of people likely to be affected;<sup>25</sup>
- how the action proposed compares with historical trends;<sup>26</sup>
- social factors and conditions likely to be affected;<sup>27</sup>
- source of effects (impacts);<sup>28</sup>
- duration of effects (impacts);<sup>29</sup>
- location and magnitude of the effects of the action.<sup>30</sup>

The use of standard categories of information and the routinization of the procedures assisted in the development of the interdisciplinary team approach to planning and thus the normative use of sociological information. This approach is the normal pattern of problem solving and new programme development in the Forest Service and conforms to the concept of 'pre-formed decision making' which has been articulated by Kaufmann.<sup>31</sup>

The Magnuson Act<sup>32</sup> provides for the establishment by the Secretary of Commerce of 'advisory guidelines, based on the national standards, to assist in the development of fishery management plans'. These guidelines are designed to achieve consistency in 'the development, content, submission, amendment, review, and implementation of fishery management plans'.<sup>33</sup> As such they provide the framework within which the Councils and Fisheries Service develop and review plans. A section of the guidelines deals with social impact assessment and sociological factors which should be considered in the development of a fishery management plan.<sup>34</sup>

The regional fishery management councils are responsible for developing fishery plans, and each council has a scientific and statistical committee (SSC) to assist it. The SSC's membership is, typically, drawn from the staff of the NMFS Regional Office and Fishery Science Center laboratories in the council's region; from faculties of universities and research institutes, and the staff of member states' marine fishery offices or divisions. The SSC as a whole, or through a plan development team, performs the interdisciplinary role called for by NEPA<sup>35</sup> in the development and preparation of plans. The drafting of fishery plans is normally carried out by biologists and economists on the staff of the councils.

Unlike the Forest Service, the Fisheries Service has only one sociologist on its staff, and thus review and advice on social impact analysis usually only occurs after the plan has been submitted for formal consideration by the agency. The SSCs normally have at least one university sociologist or anthropologist as an appointed member, and thus every plan should have the benefit of expert review as it is developed. In fact, as Paredes<sup>36</sup> has noted, the opportunity to make substantive changes is not often available to members of the SSC because of the pressure of work due to the number of actions being considered. The role of the SSC is often seen by councils as that of 'quality control' for the plan development team which usually does not have an anthropologist or sociologist as a member. Thus the SSC – if it meets regularly, and if the council accepts its advice – is expected only to alert the council to any major problems in plan development or the fisheries.

<sup>24</sup>US Department of Agriculture, *Forest Service Handbook: FSH 1909.17: Economic and Social Analysis Handbook*. US Forest Service, Washington, DC, 1983, Chapter 30, Section 32.12.

<sup>25</sup>40 CFR 1501.7.

<sup>26</sup>FSH 1909.15.

<sup>27</sup>FSM 1973.3: FSH 1909.15.

<sup>28</sup>40 CFR 1508.7 and 1508.8; FSM 1973.23.

<sup>29</sup>FSH 1909.15; FSM 1972.31.

<sup>30</sup>FSM 1970.3.

<sup>31</sup>Herbert Kaufmann, *The Forest Ranger: A Study in Administrative Behavior*. The Johns Hopkins University Press for Resources for the Future, Baltimore, 1960.

<sup>32</sup>16 USC 1851.

<sup>33</sup>50 CFR 602.1.

<sup>34</sup>50 CFR 602.3(b) (11)

<sup>35</sup>42 USC 4332.

<sup>36</sup>J. Anthony Paredes, 'Any comments on the sociology section, Tony?': committee work as applied anthropology in fishery management', Paper presented to the Annual Meeting of the American Anthropological Association, 1982.

**Table 2. Analysis of planning guidelines.**

<b>Fisheries Service<sup>a</sup></b>	<b>Forest Service<sup>b</sup></b>
1. Magnuson Act provides for advisory guidelines	1. NFMA authorizes preparation of Forest Service guidelines
2. Guidelines provide format for fishery management plans	2. Guidelines provide format for forest management plans
3. Guidelines require sociological analysis in plan	3. Guidelines require sociological analysis in plan
4. Guidelines specify units of sociological analysis	4. Guidelines specify units of social impact analysis
	5. Guidelines specify use of social scientists on interdisciplinary planning team
	6. Guidelines provide information on form of social impact analysis

<sup>a</sup>50 CFR 602.  
<sup>b</sup>40 CFR 1500.

### Discussion

The ground rules for the development of resource management plans are similar. Both agencies have provided guidelines (see Table 2) to planners, and have conducted workshops and training sessions. The difference between the forest and fishery plans lies in the use of the interdisciplinary approach called for by NEPA, NFMA and the Magnuson Act. The Forest Service has been able to ensure that membership in plan development teams reflects the three elements – ecological, economic and sociological – required for resource planning and impact assessment. In consequence, forest plans contain social impact assessments and analyses, and these have been used in the determination of multiple-use sustained yield.

The split in responsibility for plan development and review between the regional fishery management councils and the Fisheries Service has not encouraged the use of sociological factors in fishery planning. Of 17 fishery plans (see Table 3), selected at random from the 26 plans prepared and implemented under the Magnuson Act since 1977, only four plans had material which met all the requirements of the section on social and cultural frameworks in the guidelines.<sup>37</sup> None of these four plans had proposed a management action in which social impact analysis was an important factor in deciding on the allocation of optimum yield. In short, it was apparent from the review that the councils were not ensuring that the plans fully considered social impacts. It could be argued that plan development teams and/or scientific and statistical committees were not incorporating social science information and social impact analyses in plans and their calculations of optimum yield because they were not interdisciplinary teams as required by NEPA and the

<sup>37</sup>50 CFR 602.3(b) (11).

**Table 3. Sociological analysis found in fishery management plans.**

<b>Content of analysis<sup>a</sup></b>	<b>No. of plans (N=17)<sup>b</sup></b>
Ethnic character, family structure, community organization	4
Age and education profiles of fishermen	6
Employment opportunities and unemployment rates	9
Recreational fishing	6
Economic dependence on fishing or related activities	11
Distribution of income in fishing communities	11

<sup>a</sup>Categories used in the Operational Guidelines (50 CFR 602.3(b)(11)).

<sup>b</sup>Five plans had no sociological analysis.



Magnuson Act. However, the plans were implemented because the Magnuson Act, in an attempt to avoid delays in management actions, states that plans should not be deferred if needed information is missing. The Fisheries Service has recommended plans to the Secretary for acceptance if there are no major problems in conformity to the national standards of the Magnuson Act and if the sections in the plan on biological and economic aspects of the fishery are complete, and the plan notes the need for further research on sociological aspects of the fishery. The combination of these factors – lack of interdisciplinary teams, and the use of the loophole in the Magnuson Act – leads to planning which does not meet the definition of optimum yield in the Magnuson Act.

However, identifying the problem does not address its cause. Two factors appear to be involved: the organizational climate in which resource planning decisions are reached, and the problems of dealing with uncertainty. These two factors will be the focus of this discussion, and problems of dealing with uncertainty will be considered first.

Traditionally both agencies have had resource monitoring and research missions, and for this reason have been staffed principally by biologists and other natural scientists. Furthermore, the resource management legislation has always taken its departure point from a real or perceived threat to the integrity or viability of the resource. Thus the biological status of the resource can be said to have been the initial principal concern of Congress; the economic and social impacts on users were concerns that were articulated later and included in the legislation. Thus the primary concern of the Magnuson Act was to prevent overfishing and, as a corollary, to reduce foreign fishing pressure off the US coasts and encourage domestic fishermen to develop their industry further. However, to manage a biological resource is to manage its use and users.

At the time of the enactment of the Magnuson Act and NFMA in 1976, both agencies had experienced resource biologists and a store of biological knowledge about their resources. To a much lesser extent the agencies had economists and economic information available to them. Neither agency had any social impact data available, and few social scientists had worked on resource management issues for the agencies. Thus, as resource management began, the agencies had biological knowledge and knew that it would be used in decision making. The availability and scope of economic and sociological information was uncertain, but the agencies knew it would have to be developed and used.

Douglas and Wildavsky<sup>38</sup> have argued that when there is a situation in which knowledge and experience are incomplete, and there is disagreement on the course to be taken, decision makers choose the course with the least risk. Risk should thus be seen to be a joint product of knowledge about the future and consent of the actors about the most desirable course of action. This is shown schematically in Table 4. In the case of both agencies the agreement (complete consent) on the certainty of knowledge about the biological aspects of knowledge needed for resource management led to automatic incorporation of the information in the plans, and problems were seen as 'technical' which could be resolved by 'calculation'.

In the Forest Service, uncertainty about economic and social impact information was tempered by agreement (complete consent) that this

<sup>38</sup>Mary Douglas and Aaron Wildavsky, *Risk and Culture: An Essay on the Selection of Technical and Environmental Dangers*, University of California Press, Berkeley, 1983, pp 4–7.

**Table 4. Use of planning information.<sup>a</sup>**

		Knowledge	
Consent	Certain		Uncertain
Complete	Problem: technical Solution: calculation		Problem: information Solution: research
Contested	Problem: (dis) agreement Solution: coercion or discussion		Problem: knowledge and consent Solution: ?

<sup>a</sup>Derived from Mary Douglas and Aaron Wildavsky, *Risk and Culture*, University of California Press, Berkeley, 1983, p 5.

information should be used. Under these circumstances, the Forest Service was faced with a situation of complete consent/uncertain knowledge (top righthand box of the Douglas and Wildavsky typology), and the solution to the problem of lack of information was the development of a research programme. The inclusion of economists and sociologists on the interdisciplinary teams served to both identify information needs and to incorporate information into the planning system.

The regional fishery management councils and the Fisheries Service agreed on the need to include economic data in fishery management plans, even though knowledge of the economics of fisheries was uncertain. There was however disagreement on the incorporation of social impact analysis in the plans, and given the uncertain level of sociological information, the solution was not to include social impact analysis (see the bottom righthand box in the Douglas and Wildavsky typology). This pattern of knowledge and consent can be seen clearly in the contents of fishery management plans. In the 17 reviewed at random, 31% of the pages were occupied by biological analyses, 15% considered the economic aspects of the fishery and 0.5% were devoted to sociological analysis and information (see Table 3). One plan, for example, stated that there were 'unlikely to be any outstanding social and cultural impacts associated with implementation'. It then reviewed comments by social scientists on the need for fishery-specific anthropological or sociological research, noted that there were no research findings available for the fishery, and concluded:

To the extent that potential social and cultural impacts of the lobster management program would originate from economic impacts of the program, [the economics section] provides an analysis of the range and distribution of likely impacts on various user groups.<sup>39</sup>

In summary, the risk in resource plan development lies in adverse user and public comments, further deterioration of the resource, and challenges to agency competency. In dealing with the uncertain elements involved in problem solving and planning, agencies seek solutions which are grounded in the certainty of knowledge and the agreement of those involved. Where knowledge is uncertain, the agency can commission research to fill the gap and this was the course of action followed for economics by both agencies, and for social impact analysis by the Forest Service. The need for sociological information was contested by councils and, given uncertainty about data needs, social impact analysis was given a low priority although it is required by the Magnuson Act and NEPA.

Over time the organizational process of policy making and planning in the Forest Service has become an iterative one.<sup>40</sup> Policy flows down from the National Office in Washington, DC to the individual Ranger Districts. Any problems in implementation are relayed back to the

<sup>39</sup>New England Fishery Management Council, *American Lobster Fishery Management Plan: Public Review Draft*. 16 August 1982, p 107.

<sup>40</sup>*Op cit*, Ref 31, p 156.

National Office from each organizational level and adjustments are made as appropriate. When the policy has proven to be workable, the administrative instruction is added to the Forest Service Manual and the standard operating procedures, embodied in the Forest Service Handbook, of the Forest Service.

Planning begins at the Ranger District level and is developed according to the guidelines in the Forest Service Manual and Handbook. Review in the offices of Forest Supervisors and Regional Foresters, and in the National Office ensures that planning is in compliance with the guidelines and that there is national agreement on any departures from them. As policies and planning systems are first introduced, latitude is permitted while problems are worked out. Kaufman suggests that the 'pre-formed decision making' based on the guidelines goes through three stages of development as experience with the system is gained. He characterizes these stages as 'authorizations', 'directives', and 'prohibitions', and each stage provides a varying degree of latitude in decision making by the resource managers.<sup>41</sup> Authorizations give forest managers scope in accomplishing tasks, with the understanding that the policies of the Forest Service will be adhered to as closely as possible. At the other end of the scale, prohibitions define unacceptable actions which would automatically incur sanctions.

The intricate system of clearances, concurrences and inspections developed by the Forest Service ensure that actions conform to the Forest Service Manual and Handbook procedures. Further, Culhane<sup>42</sup> and Kaufmann<sup>43</sup> argue that the shared experiences of foresters at all levels of the service provide cultural bonds and peer pressure which combine to ensure conformity with the norms of the service. Thus, once the use of sociological data in forest planning became part of the policy of the Forest Service it became one of the tasks to be undertaken in all resource management plans; and, secondly, because of the system of clearances and concurrences all managers concerned with planning would be aware that social impact data should be sought and used.

In its approach to the use of social impact data, the Forest Service has, in fact, continued its past practice of developing directives to implement legislative mandates. The regulations implementing the NFMA<sup>44</sup> provided the opportunity or, in Kaufmann's terms, 'authorization' to explore the use of interdisciplinary teams including sociologists and the development of social impact analysis. This period of exploration ended in September 1983 with the circulation of the Forest Service's Economic and Social Analysis Handbook, and the service now operates under a (in Kaufmann's terms) 'directive'.

This pattern of action, exploring issues and building upon experiences, has been described by Lindblom<sup>45</sup> as strategic analysis, which he has defined as 'informed and thoughtful choice of methods of problem simplification'. The involvement of all levels of the Forest Service, and the provision of a period of trial and error enabled the agency to develop a coherent strategy over time which recognized the complexity of resource management problems. By 'muddling through'<sup>46</sup> in this manner the Forest Service avoided the pitfall of seeking a 'scientific' or 'synoptic' solution which would be complete and would meet all conventional theoretical requirements; an impossible task as Lindblom notes.<sup>47</sup>

In contrast, the approach of the regional fishery management councils and the Fisheries Service has been haphazard. The councils, of course,

<sup>41</sup>*Ibid*, pp 157-160.

<sup>42</sup>Paul J. Culhane, *Public Lands Politics: Interest Group Influence on the Forest Service and the Bureau of Land Management*, The Johns Hopkins University Press for Resources for the Future, Baltimore, 1981.

<sup>43</sup>*Op cit*, Ref 31, p 197.

<sup>44</sup>36 CFR 219.

<sup>45</sup>Charles E. Lindblom, 'Still muddling, not yet through', *Public Administration Review*, Vol 39, 1979, pp 517-525.

<sup>46</sup>Charles E. Lindblom, 'The science of muddling through', *Public Administration Review*, Vol 19, 1959, pp 79-88.

<sup>47</sup>*Op cit*, Ref 45, p 518.

were formed in 1977 and had no experience of managing fishery resources. The agency also had minimal experience in this regard which could be applied to 'optimum yield' patterns of management. Partly this was because, until 1976, the National Marine Fisheries Service and its predecessor agencies were primarily small scientific research organizations in support of the development and utilization of fish stocks. The collegial practices of science, the small size of the organization, and the search for knowledge of the biology of fisheries, did not create the necessity for a uniformity of bureaucratic action and a pattern of administrative conformity in the Fisheries Service. The custodial role of the Fisheries Service developed in the early 1970s with the passage of NEPA, the Marine Mammals Protection Act and the Endangered Species Act. However, experience with these acts and the international fishery commissions did not lead the Fisheries Service into a fishery management role which required the integration of biological, economic and sociological information in formalized procedures. In particular, fishery management policy formulation and planning involved only a fraction of the agency's personnel.

The lack of experience and the need to put the Magnuson Act into effect immediately led the councils and Fisheries Service to develop formal procedures and to attempt to implement them without a period of trial and error, or an understanding of the varied perspectives of councils, Fisheries Service and user groups concerning the aims of the Magnuson Act. After initially adopting a synoptic approach to management, a period of legalistic attempts to resolve issues ensued. In turn these were replaced by politically-driven attempts at fishery management as constituencies, troubled by the apparent disarray, appealed to Congress and the states for action. The formal decision making techniques initially used by both councils and the NMFS were those based on scientific assessments, but neither councils nor NMFS had the resources to make decisions in the time and resource frameworks available, and thus were only partially successful. As Lindblom had noted:

... these advanced [scientific or synoptic] procedures remain largely the appropriate techniques of relatively small-scale problem solving where the total number of variables to be considered is small and value problems restricted.<sup>48</sup>

As plans were developed, and reviewed and implemented, a corpus of experience evolved and both councils and the Fisheries Service began a process of 'muddling through'. There was a mutual adjustment of objectives, and a pattern of policy and value decisions began to emerge. The simplification of the fishery management planning that occurred was achieved by 'concentrating on policies that differ only incrementally ... [and was] not a capricious kind of simplification'.<sup>49</sup> Rather the issues, such as social impact analysis, on which there was less than total agreement were ignored as irrelevant to the planning process. The process of 'muddling through', conducted in the full light of media coverage and Congressional oversight, was one of 'disjointed incrementalism' as described by Lindblom.<sup>50</sup>

Disjointed incrementalism in decision making is a perfectly appropriate pattern of analysis and policy formulation, since it produces results in situations in which conventional attempts at formal completeness would fail.<sup>51</sup> However, as Lindblom notes, disjointed incrementalism is not an optimum pattern of decision making and full strategic analysis

<sup>48</sup>*Op cit*, Ref 46, p 80.

<sup>49</sup>*Ibid*, p 85.

<sup>50</sup>*Op cit*, Ref 45, p 517; see also Timothy M. Hennessey, ed, *The United States Fishing Industry and Regulatory Reform: Proceedings of the Fifth Annual Conference of the Center for Ocean Management Studies*, Wilson Publishing Company/Times Press, Wakefield, 1983; J.E. Kelly, 'The Fishery Conservation and Management Act: organizational structure and conceptual framework', *Marine Policy*, Vol 2, No 1, 1978, pp 30-36.

<sup>51</sup>*Op cit*, Ref 45, p 519.

should be the target aimed for by councils and the Fisheries Service. This is because disjointed incrementalism is constrained at six points. It is limited in its analysis to a few familiar policy alternatives; there is a mixing of analysis of policy goals and values with the empirical aspects of the problem; policy analysts and planners are preoccupied with the problems to be remedied rather than positive goals to be sought; there is a sequence of trials, errors and revised trials in the application of disjointed incrementalism; the analysis explores only some of the possible consequences of alternatives; and, finally, there is a fragmentation of planning and policy analysis between many, often partisan, participants.<sup>52</sup> The lack of interdisciplinary fishery management plan development teams, and the fragmentation of review and plan development between two organizations with different world views, suggests that disjointed incrementalism may be the appropriate decision making strategy. However, the quality of the plans could be improved if sociological factors were included in the initial analyses, since the interdisciplinary teams are an aspect of the problem that can be addressed easily.

In summary, the organizational climate in the Forest Service is one that has developed over 80 years of resource management experience. It provides for the incorporation and testing of new objectives and strategies and, after acceptance, for their application at all levels of the National Forest System. This pattern of management, termed strategic analysis by Lindblom, has made it possible for the Forest Service to act upon the requirements of NEPA and NFMA. Thus social impact analysis and interdisciplinary teams of natural scientists, economists and sociologists have become part of the management system. On the other hand, the regional fishery management councils and the Fisheries Service started from scratch in developing forms of organizational behaviour which would attain the complex goals and objectives of the Magnuson Act. After much experimentation and many problems, a pattern of disjointed incremental analysis and planning has emerged. The need to compromise between the needs of different sectors and actors in fishery management has meant that only some parts of the optimum yield equation have been treated fully as councils and the NMFS have explored areas of agreement and disagreement on policies and procedures. Thus the use of interdisciplinary teams has not been fully realized, and social impact analysis has not been included in the majority of plans.

## **Conclusions**

This comparison of the resource planning practices of the US Forest Service and the National Marine Fisheries Service shows that problems in incorporating sociological information and social impact analyses are fully resolved only where there is full agreement (consent) on the use of the knowledge included in the decision making process. Further, that successful inclusion of information requires the development of patterns of strategic incremental planning. For these reasons the Forest Service has been able to accommodate the NEPA and NFMA requirements that planning be done by interdisciplinary teams and incorporate social impact analyses, while the Fisheries Service has not. For the NEPA and Magnuson Act mandates to be met, it is considered that the Fisheries Service and the regional fishery management councils must ensure that

<sup>52</sup>*Ibid*, p 517.

plan development teams include natural scientists, economists and sociologists or anthropologists and, furthermore, that there is agreement that social impact analyses are a required part of the development of optimum yield and NEPA environmental assessments and impact statements.

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