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Sociocultural Aspects of Fisheries Management

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"...the management of fish requires management of fishermen,
and that is not a simple problem."

--Spencer Appolonio (1978:26)

I. INTRODUCTION

Sociocultural impacts of fisheries management have become somewhat of an issue since the Fishery Conservation and Management Act (FCMA) of 1976 (PL-94-265) mandated that regulations must consider social as well as economic and biological impacts of fisheries management in the United States. Today, the almost universal extension of economic zones out to 200 miles has resulted in fisheries management becoming an increasingly important issue in much of the developing world as well as industrialized nations. Although the United States is far from resolving many of the problems associated with fisheries management, it is clear that nations in the planning stages of developing fisheries management schemes can learn from previous mistakes and avoid some of the pitfalls that have plagued existing management programs.

Biological and economic aspects of fisheries management have posed problems for management, but the area that is least understood, and of equal importance, concerns its social aspects. In response to management's questions concerning social information, much time has been spent constructing trait lists of data

needs which resemble outlines of a community in introductory social science text books. In the process of focussing on "social" data that can be collected concerning fishermen, little attention has been directed to linkages between aspects of fisheries management and specific social impacts which can be effectively employed in construction of bio-socio-economic models of the fishery to be used in development and evaluation of management decisions. Notable exceptions to this generalization can be found in the work of Acheson (1980), Acheson and Reidman (1980), Acheson, et al (1980), Anderson (1980), Miller and Van Maanen (1979), Miller and Pollnac (1978), Pollnac and Poggie (1979), Smith (1977), and Wilson and Acheson (1981).

Additionally, it is important to note that social aspects of management also include consideration of the relevant social environment of implementation. Concerning fishery management, Roemer (1978) has written that in addition to technical considerations, implementation depends on political and special interest group support as well as bureaucratic coordination. Thus social information should also include an analysis of the institutional matrix of the process of management plan development and implementation.

The purpose of this paper is thus twofold: (1) to identify specific impacts of management decisions and outline data needs concerning these impacts; and (2) to identify relevant aspects of the social environment of the development and implementation of fisheries management plans. Identification of these socio-cultural information needs will provide a cost-effective alternative to the shotgun approach of cataloging all sociocultural variables within a fishery--an approach that results in reams of uninterpreted data that can, only with a stretch of the imagination, be referred to as a social impact statement (cf. Schindler 1976).

II. POTENTIAL CONSEQUENCES OF MANAGEMENT

"The crucial issue for management is not how many statistics can be used by fisheries science but, rather, how few are essential to harvest most of the benefits of timely action."

--James A. Crutchfield (1972)

Fisheries management schemes have four important potential consequences which may result in short- and/or long-term negative sociocultural impacts on fishermen. These are: (1) a decrease in income; (2) changes in the structure of the fishery; and (3) actual displacement of fishermen from the fishery. The fourth consequence, perceptions of rules as 'bad' or 'unfair'; is actually a consequence of fishermen's perceptions of the management plan's effects in terms of the first three consequences. These potential impacts are addressed sequentially below.

Income Reduction One immediate consequence of management plans directed at reducing exploitation of endangered stocks is a loss of income to fishermen who traditionally focus on the affected species. Almost any type of conservation technique, including gear restrictions, closed seasons or areas, catch quotas, or limited entry can result in decreased income if fishermen cannot quickly and economically shift to another species.

A loss of income has numerous sociocultural consequences. First would be a potential need for some type of economic assistance. One of the first responses to the ground fish management plan in New England was concern voiced by Gloucester fishermen who noted that decreases in income would mean economic disaster for those with large mortgages on their vessels (Miller and Pollnac 1978). Crewman, who receive a share of the catch in contrast to a salary, were concerned about meeting automobile and house payments.

A social variable which exacerbated these potential problems in Gloucester is

the extent of kinship involvement in the fishery. For example, much of the Gloucester fleet is composed of fishermen of Italian descent (Miller and Pollnac 1978; Miller and Van Maanen 1979). Some of them are relatively recent immigrants. A pattern exists wherein a successful immigrant, one who has accumulated enough capital to purchase a vessel, will sponsor kinsmen from Italy and use them as crew on the vessel. Consequently, there is a high degree of family involvement in the fishery. The family is thus like an undiversified firm--when disaster strikes the fishery, the entire kinship network is affected, resulting in more human misery than if family members were involved in diverse occupations and could support one another through lean periods affecting only one of the occupations. This degree of kinship involvement increases the need for economic assistance from outside the family.

The need for financial assistance, as well as the lowered economic status resulting from decreased income, often results in lowered self-esteem on the part of fishermen. Danowski, in a study of fishermen's wives in Rhode Island, notes that "what the women like best about fishing is its favorable effect on their husbands and on their finances" (1980:3); thus, lowered economic status and self-esteem on the part of fishermen would have a negative effect on their wives' perceptions of the occupation. The wives' attitudes would, in turn, lower the fishermen's self esteem even farther. All of this would reduce their level of job satisfaction, a variable with significant sociocultural impacts ranging from longevity to family violence and productivity (Pollnac and Poggie 1979).

Changes in the Structure of the Fishery Management plans often result in changes in the structure of the fishery. For example, closure of specific geographic regions may require vessels to travel farther to fish, possibly necessitating larger, more sea worthy vessels and more time at sea. Species restrictions may require gear changes to harvest other non-restricted species. Controlled access may decrease the number of fishermen and vessels. Finally, trip limits may be set

so low that it would be uneconomical to go to sea in large vessels; thus giving an advantage to smaller, less expensive to operate vessels. These examples are not exhaustive, but they are representative of consequences of management which have clear social impact.

Potential sociocultural impacts of the need for larger, more seaworthy vessels or gear changes are related to the fact that not all vessel owners will be able to afford to make these changes; thus some unfortunate owners will be forced to become crewmen, fish inefficiently or illegally with their present gear, or drop out of the fishery. Restrictive licensing can also result in increased costs (cf. Pearse and Wilen 1979) and changes in ownership patterns (Alexander 1980).

Changes in ownership patterns are not to be taken lightly in the fishery. One of the most frequently cited occupational characteristics of fishing is the freedom to come and go as one pleases (Poggie and Gersuny 1974; Pollnac and Poggie 1979). In owner-operator fleets, the captain and crew usually consult on schedules; thus most fishermen participate in decisions concerning when they will go out fishing. As increasing capital costs result in a shifting to non-operator owners (e.g. large firms, etc.), this relative independence is lost, thus affecting an important aspect of job satisfaction. In the developing world, costly technological changes can result in increases in social stratification as the means of production are concentrated in the hands of a few, relatively wealthy entrepreneurs (cf. Pollnac 1978). These increases in social stratification are often followed by periods of social unrest as a result of perceived social inequities.

A good example of how changes in ownership patterns as a result of restrictive licensing can have negative social impact is provided by Alexander (1980). Traditionally in Sri Lanka, beach seine nets were owned by shares (thus poor fishermen had access to relatively expensive equipment), and access to the beach was in control of kinsmen. An initial attempt by the government to regulate the fishery

was based on site registration with control in the hands of a government appointed licensee who was frequently a fish trader and not a member of the local community. Crewmembers were paid a small wage, rather than the traditional share of the catch, and when they objected, the licensees replaced them with imported labor. The responses to these changes in ownership patterns and lowered economic status were violent--"nets were burned, licensees killed, and the fishing villages gained a reputation for violence which persists to this day" (Alexander 1980:9).

The potential necessity of spending more time at sea as a result of closure of specific geographic regions may also have negative social consequences. There are parts of the developing world where fishermen spend part of their time farming. In these areas, more time at sea may unintentionally reduce rural farm productivity, a consequence that can be ill-afforded in some parts of the developing world such as West Africa (cf. Sutinen, Pollnac, & Josserand 1981).

Additionally, length of time at sea is an important characteristic of the occupation which affects job satisfaction. Poggie and Gersuny, in their excellent study of the fishermen of Galilee, (1974) note that one of the aspects that fishermen like least about their occupation is the amount of time they are separated from their families. As a means of examining this aspect of job satisfaction more carefully, Pollnac and Poggie (1978) classified fishing types according to trip length and requested a sample of fishermen from southern New England to indicate which type of fishing they preferred most. They report that while the majority of day and short trip (2 to 3 days) fishermen indicate preference for their own style of fishing, over 50 percent of the long trip fishermen (four or more days) prefer shorter trip lengths. Overall, the trend is a preference for shorter trip length.

Perhaps even more significant with respect to both independence and family life, Pollnac and Poggie (1978) asked the fishermen to rank each of the three fish-

ing types according to family and social life, independence, income, personal enjoyment, and best future. Significantly, independence, family and social life, and personal enjoyment were the strongest predictors of preferred fishing type (all correlations greater than 0.80 (Gamma), $p < .01$). Although statistically significant, ($p < .01$), the correlation between income and preferred fishing type ranged only between 0.46 and 0.65. The correlation with income was highest for long trip fishing.

Trip limits can also affect the structure of a fishery. For example, when the ground fishery was closed in New England in 1977 the incidental catch permitted was 5510 pounds per trip. Many felt that this rule benefited inshore fishermen-- inshore fishermen could fish economically while the off-shore could not; thus, changing the structure of rewards within the fishery. This inequity resulted in a changing of the rules by an emergency amendment which allocated catch according to vessel size. By the last week in 1977 the fishery was closed.

During the closure small Gloucester draggers focussed on whiting which they thought could be legally caught. Captains of larger vessels were angered by what they felt was a divisive action by the smaller vessels. Arguing that they could not make a living by fishing for whiting, they met the incoming vessels and blocked the transfer of fish. Tempers flared, and fighting broke out (Miller and Pollnac 1978); thus the closure divided the fishery and led to social violence between fishermen occupying different structural positions within the fishery.

In a well-intentioned attempt to forestall early closure of the ground fishery in 1978, the New England Fishery Management Council instituted quarterly allocations (Appolonio 1978). Fishermen operating the smaller draggers soon began to grumble that larger vessels would harvest the quota before the weather would break enough to allow them to go out fishing. By the end of February these predictions came true. Harvesting of cod was reduced to incidental catch through

March 31st; thus, the smaller draggers would not be able to fish at maximum capacity when the weather became favorable. Hard feelings developed within the smaller fleet, once again dividing the fishery (Miller and Pollnac 1978).

The response to this problem took the form of quotas for specific vessel classes to insure that each could harvest its fair share of the resource. Appolonio notes that these vessel-class allocations "...implicitly set new plan objectives, neither biological nor economic, but now largely sociological, or at least socio-economic, in nature". Trip and weekly limits were soon added to these quotas resulting, once again, in economic hardship with the various consequences discussed above.

Displacement from the Fishery As noted above, management schemes have a potential of both reducing income and changing the structure of the fishery. The previous two sections of this paper outlined how these factors can result in forcing some fishermen out of the fishery altogether. Management schemes which limit entry, however, often have as a direct result the displacement of fishermen from the industry (Orbach 1978).. For example, the restrictive licensing of the Pacific Salmon fleet resulted in a substantial decline in the number of men employed (Pearse and Wilen 1979).

It is clear, however, that schemes which somehow limit entry often have differential effects on different groups of fishermen. These groups often differ in terms of their social and cultural characteristics; thus, the rules have the potential of effectively discriminating against specific sociocultural subgroups of fishermen. (Orbach (1978) presents several excellent examples of these unintentional social consequences of fishery management programs. For example, he points out that high taxes or licensing fees may prohibit individuals belonging to specific socioeconomic classes from fishing. He also notes how gear restrictions in the Louisiana inshore shrimp fishery have barred particular social groups, which use the restricted gear,

from fishing. Finally, he indicates that restrictions on commercial anchovy catches in southern California had a negative economic effect on the Italian fishing community of San Pedro. Orbach then proceeds to argue that being forced out of fishing is not at all like being forced out of other occupations because of various occupational characteristics (e.g., relative independence, need to deal with danger and uncertainty) which attract and hold certain types of individuals to the fishery. Additionally fishing firms are often family oriented. These aspects of the occupation make it difficult to find the same types of job satisfaction in other alternative occupations available to displaced fishermen.

It is therefore essential to determine if acceptable alternative occupations are available in areas where there is a potential for the dislocation of active fishermen. "Acceptable" is stressed because job dissatisfaction can lead to a number of negative impacts ranging from decreased life-span to family violence (Pollnac and Poggie 1979). Orbach goes as far as to suggest that "...the extreme socio- and psycho-pathological effects of the inability of many native Alaskan groups to exploit their traditional resource bases is seen in their increased incidence of crime, alcoholism, personal psychoses, suicide, and so on" (1978;225).

Impacts on Job Satisfaction

"...surely the same combination of benefits from employment in fishing accrues to most occupations."

-- James Crutchenfield (1979:751)

The discussion so far has made it clear that a sociocultural variable of central concern in fisheries management appears to be job satisfaction. The relationship between job satisfaction and the management related variables discussed thus far are illustrated in Figure 1.

Job satisfaction, as a key sociocultural variable associated with fisheries management, has numerous potential impacts on both fishermen and the societies in

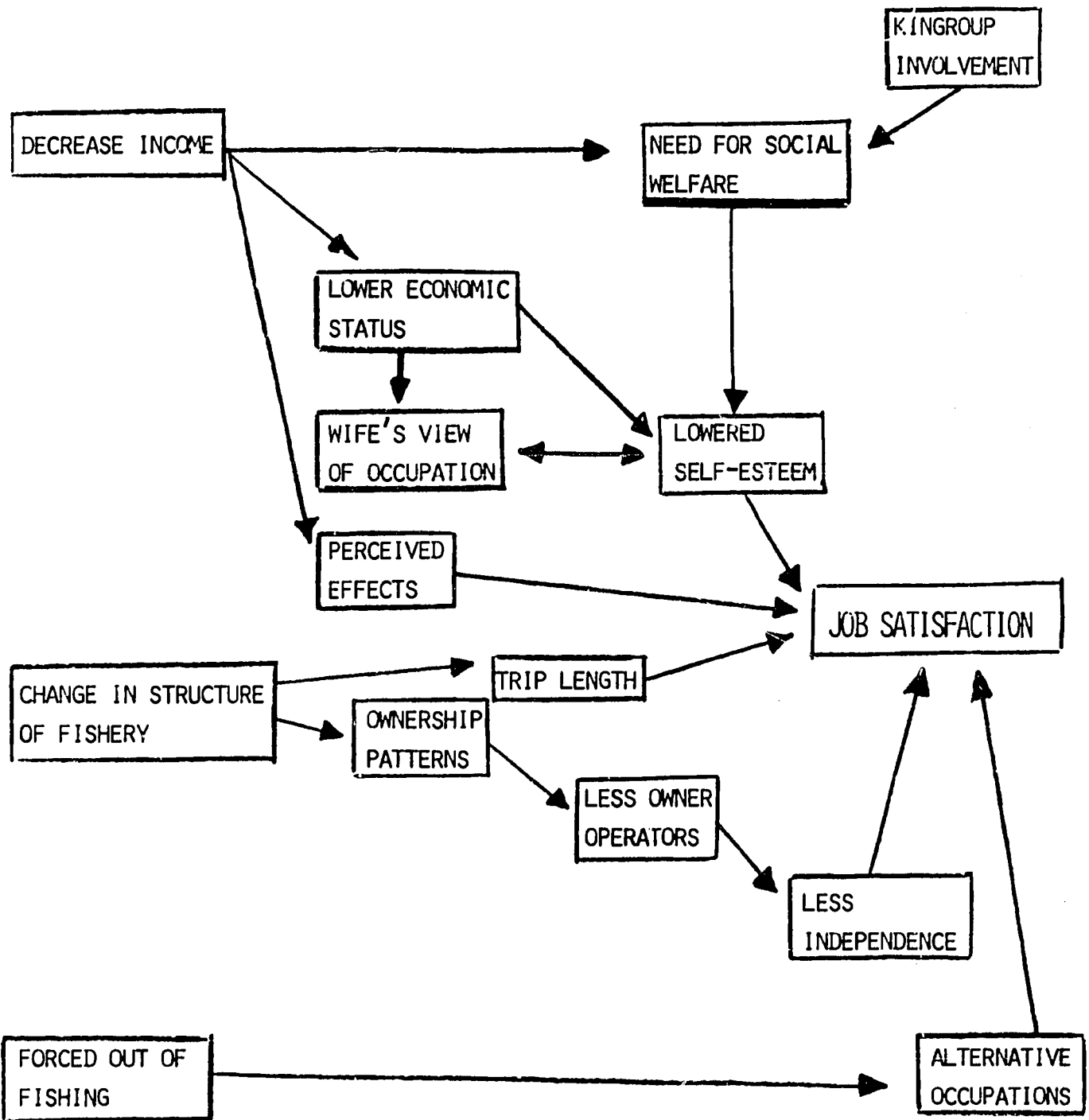


Figure 1. Relationship between fisheries management and variables related to job satisfaction.

which they live and work. Among variables related to job satisfaction which have social impact, perhaps the most important is longevity. Palmore (1969) reports that work satisfaction is more important in predicting longevity than rating by an examining physician of physical function, a measure of tobacco use, or genetic inheritance. The social impact of longevity on both the family and community is so obvious that it need not be elaborated here. Further, heart disease and other illnesses which reduce a person's ability to function in their social roles have also been related to work dissatisfaction (HEW 1973).

Other studies have demonstrated a relationship between job satisfaction and mental health. For example, Kornhauser (1965) found that jobs most conducive to mental health are those in which workers tend to be satisfied. Perhaps most important, he also found that within occupational categories mental health is correlated with job satisfaction, and that workers in lower level jobs that are satisfied differ little in mental health from satisfied workers in higher level jobs. This led him to conclude that "job satisfaction is the link between objective conditions prevailing at different occupation levels and the observed variation in mental health" (Kornhauser 1965:263). HEW (1973), summing up 20 years of research by the Survey Research Center at the University of Michigan notes that the absence of job satisfaction is related to psychosomatic illnesses, anxiety, low self esteem, worry, tension, and impaired interpersonal relationships. There is no doubt that mental health problems such as these impair one's ability to function normally in society. In addition, Gelles (1974) and Strauss (1979) report a clear relationship between job satisfaction, some of its mental health correlates, and family violence, an increasingly serious social problem. Finally, job satisfaction has been related to absenteeism, turnover (Robinson, et al 1969) and job performance (Inkson 1978; Jacobs and Solomon 1977), three variables with both economic and social impact.

Clearly the research cited above indicates that job satisfaction is related to a host of variables with important sociocultural and socioeconomic implications. The relationship between aspects of fisheries management and job satisfaction also seems to be clear as described above. Two questions remaining to be answered, however, are (1) is the structure of job satisfaction among fishermen somehow different than in other occupations? and (2) how can job satisfaction be factored into bioeconomic models for fisheries management?

Job Satisfaction Among Fishermen Turning to the first question, many investigators have argued that aspects of the occupation of fishing select for a specific type of individual (e.g., Aronoff 1967; McCay 1978, 1981; Orbach 1978; Poggie 1978; Pollnac 1976; Pollnac and Poggie 1978a). Orbach (1978) suggests that the family orientation and personality configuration of fishermen "...tends to produce a very strong 'psychological contract' between the individual and his occupation" (1978:224). Poggie and Gersuny (1974) present data which indicates that fishermen "...look upon their occupation and gain satisfaction from it in a much different way than do comparable landbound workers" (1974:66). Interviews conducted in Point Judith (1977-78) suggest that fishermen who tried other occupations and returned to fishing did so because of the relative independence and personal satisfaction provided by fishing. When requested to compare a self-selected alternative occupation with fishing, a sample of fishermen from New Bedford and Point Judith rated their present style of fishing higher in terms of income, best future, personal enjoyment, and independence. With respect to family and social life, the alternative occupation was rated slightly better by day fishermen, approximately the same by short trippers (2 to 3 days), and much better by long trip fishermen (Pollnac and Poggie 1978b). Finally, Pollnac (1981) compared small-scale Costa Rican fishermen's perceptions of fishing and farming (the most realistic alternative occupation) using the semantic differen-

tial and found that, overall, fishermen rated their own occupation more favorably.

These findings surely must influence one's perception of Crutchfield's (1979) claim that most occupations manifest the same combination of benefits as fishing. Surely there are few occupations in which people pay to participate as they do with respect to sport fishing. Of course, other occupations provide non-monetary benefits, and there is an extremely large literature dealing with job satisfaction that is concerned with these benefits (cf. Maiolo 1975), some of which is cited in this paper. The argument is that certain personality types are suited to specific occupations, and changes in the occupation (including its elimination) can result in maladjustment on the part of the affected workers, especially when alternative occupations that fulfill the same needs are not available. Thus, an important question is what specific needs does the occupation of fishing satisfy?

Turning to specific needs satisfied by the occupation of fishing, Pollnac and Poggie (1979) developed a list of 22 occupational attributes which were derived from high frequency responses to open-ended interviews with fishermen concerning job likes and dislikes. They had the fishermen rank each attribute on a five point scale (very dissatisfied to very satisfied) and factor analysed the resulting data. The analysis resulted in three factors, each of which could be clearly identified with Maslow's hierarchy of needs (Maslow 1954). For example, one factor contained only items related to basic needs (physiological and safety) such as cleanliness, physical fatigue of job, job safety, healthfulness, earnings, etc. Another factor was composed of middle level needs (self esteem and love and belongingness) characterised by attributes such as time away from home, hours spent working, freedom to come and go as one pleases, opportunity to be own boss, etc. Finally, the high level needs factor was composed of items such as adventure, challenge of job, feeling you are doing something worthwhile, etc., all of which represent the level Maslow referred to as self-actualization.

Individuals were assigned a score on each of the three "needs" factors based on responses to individual items (factor scores). There was a fair amount of variance in factor scores which was found to be related to sociocultural variables such as port, ethnicity, age, fishing type, and entry into the occupation at an early age. Additionally, satisfaction on need levels did not seem to proceed in a cumulative manner as outlined by Maslow (1954). Instead, the fishermen seemed to satisfy cyclically--once satisfied on the highest levels, concern seemed to develop with lower levels of needs; thus, cycling through the levels and, hopefully, achieving higher levels during each cycle.

Although these specific needs were not examined with respect to fishermen's perceptions of alternative occupations, it would be a relatively simple task to have fishermen compare fishing with other occupations on each item as was reported above with respect to a much less detailed measure. Once this were accomplished, the differences between fishing and alternative occupations could be considered as positive or negative non-monetary income for further calculations.

Clearly the amount of variability in job satisfaction and its correlation with other sociocultural variables, as well as the cyclical nature of satisfaction on the various needs levels, adds a dimension of complexity to the variable that had not been expected. Nevertheless, the techniques used to measure this complex variable are clearly defined (Pollnac and Poggie 1979) and can be used by others to create standardized scores which can be factored into bio-socio-economic models for fishery management purposes.

Job Satisfaction and Fishery Management Anderson (1980) has argued that what he calls worker satisfaction bonus (WSB) must be jointly considered with industry profit, consumer supplies, and other factor rents in calculating the proper maximand for optimal allocation of resources in an open access commercial fishery. He illustrates how failure to account for WSB will result in erroneously high

estimated opportunity cost wage which will lead to economically inefficient policy recommendations.

Holt (N.D.) refers to WSB as psychic income and notes that the occupation of fishing has some aspects that can contribute to psychic income and some to psychic loss. Holt's analysis suggests that "...sizeable psychic benefits (and the outside income to pursue them) will lead to larger open access (and potentially limited access) fleet effort than that expected on a simple profit basis. Psychic benefits in the presence of rapid fleet expansion and relatively slow population adjustments can threaten a fishery with biological collapse" (N.D.:22). Further, Holt's results partially confirm Pollnac and Poggie's findings that job satisfaction (or psychic income) is complexly related to fishing type and other variables such as retirement status and years of fishing experience.

Job satisfaction, thus appears to be relatively significant from a fishery management point of view. The literature, however, makes it clear that there is no single job satisfaction measure for the entire occupation of fishing. Levels of job satisfaction vary according to fishing type and sociocultural characteristics of the fishermen (cf. Pollnac and Poggie 1978; 1979). Further, although in most instances there appears to be a relatively high degree of commitment to the occupation of fishing, there are areas where the conditions are so harsh that some fishermen would prefer to change occupations. For example, Smith (1979) reports that among municipal fishermen surveyed in 16 villages in the Philippines almost 50 percent are willing to leave the fishery for other employment. It is important to note, however, that those fishermen willing to change are in villages characterized by younger fishermen as well as relatively lower levels of income, boat ownership, and fishing effort (Smith 1979). It thus seems to be relatively clear that job satisfaction is multidimensional, and there appears to be trade-offs between the various dimensions with respect to different fisheries and categories of fishermen.

Two graphic examples should serve to illustrate these trade-offs. Polinac and Poggie (1979) calculated mean factor score values on each of the three needs level dimensions for inshore and offshore fishermen in New England. The mean values for these standardized scores are plotted for each group in Figure 2. This figure clearly illustrates a trade-off between satisfaction of basic needs and middle and high level needs. In maximizing satisfaction of basic needs, middle and high level needs seem to suffer.

Figure 3 illustrates how levels of need and satisfaction differ across ports. Once again the trade-offs are obvious.

Finally, Figure 4 illustrates mean ranks of different fishing types on several dimensions as perceived by the sample of fishermen. Once again, the perception of trade-offs is obvious. The traces for long trip and day fishing are almost mirror images of one another. As perceptions of income and best future increase, personal enjoyment, independence, and family and social life decrease.

Hence, introduction of job satisfaction into decision making in the fishery will be a complex matter which will necessitate accounting for numerous aspects of this complex variable. Developments in techniques (e.g., Polinac and Poggie 1979; Smith 1977) for more rigorous measurement of job satisfaction, however, suggest that it can be factored into decision making models as a means of maximizing social, as well as biological and economic benefits of fishery management.

Perceptions of Rules as 'Bad' or 'Unfair' The final potentially negative consequence of management which will be considered in this paper concerns fishermen's perceptions of management rules as somehow 'bad' or 'unfair'. These negative perceptions can be a consequence of either inadequate communication between the regulators and the fishermen or the formulation of regulations which are not biologically, economically, or socioculturally sound from the fishermen's point of view. Often, negative perceptions result from both of these factors.

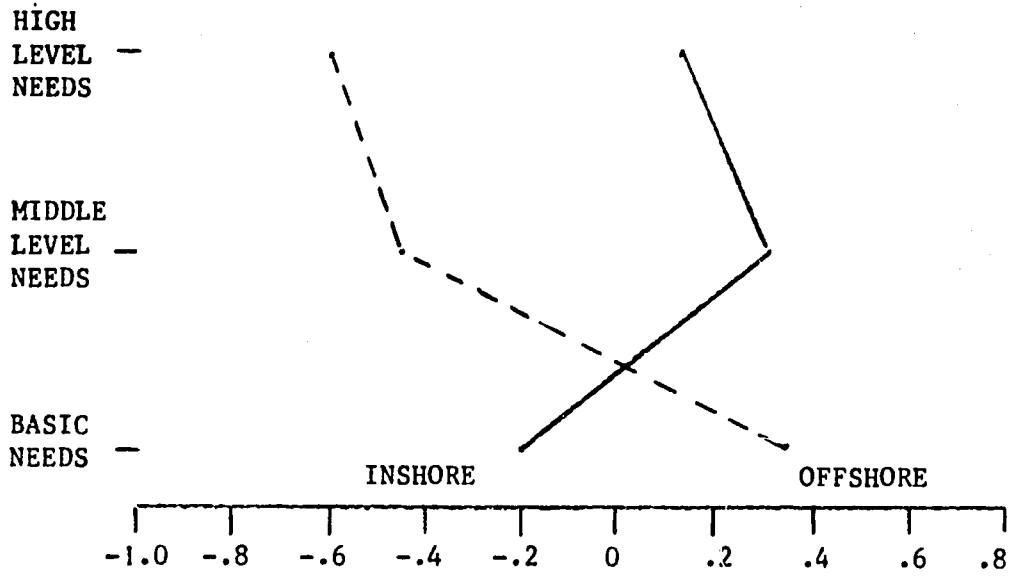


Figure 2. Mean standardized factor scores on job satisfaction dimensions by fishing type.

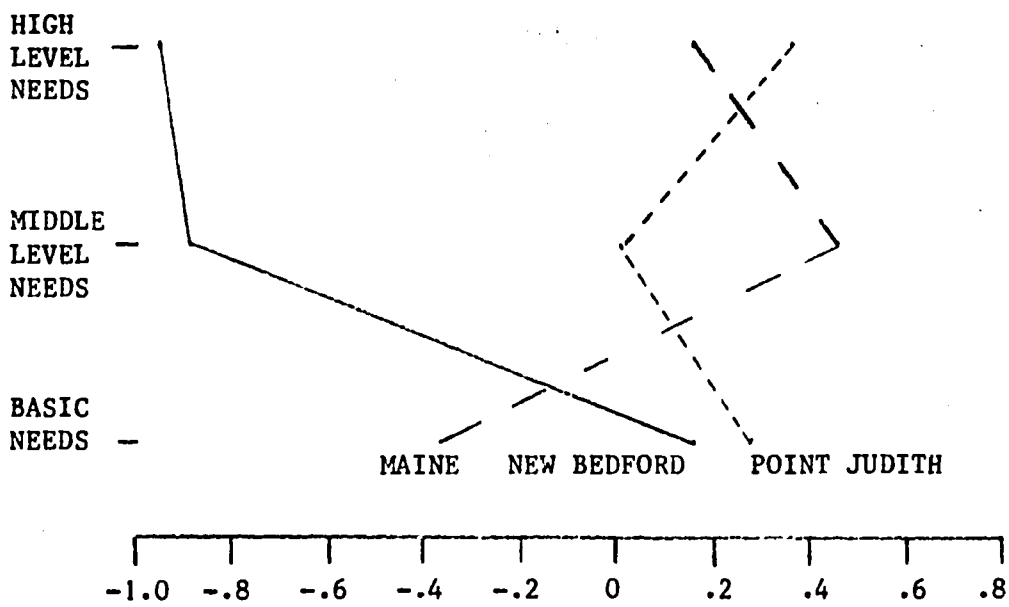


Figure 3. Mean standardized factor score on job satisfaction dimensions by port.

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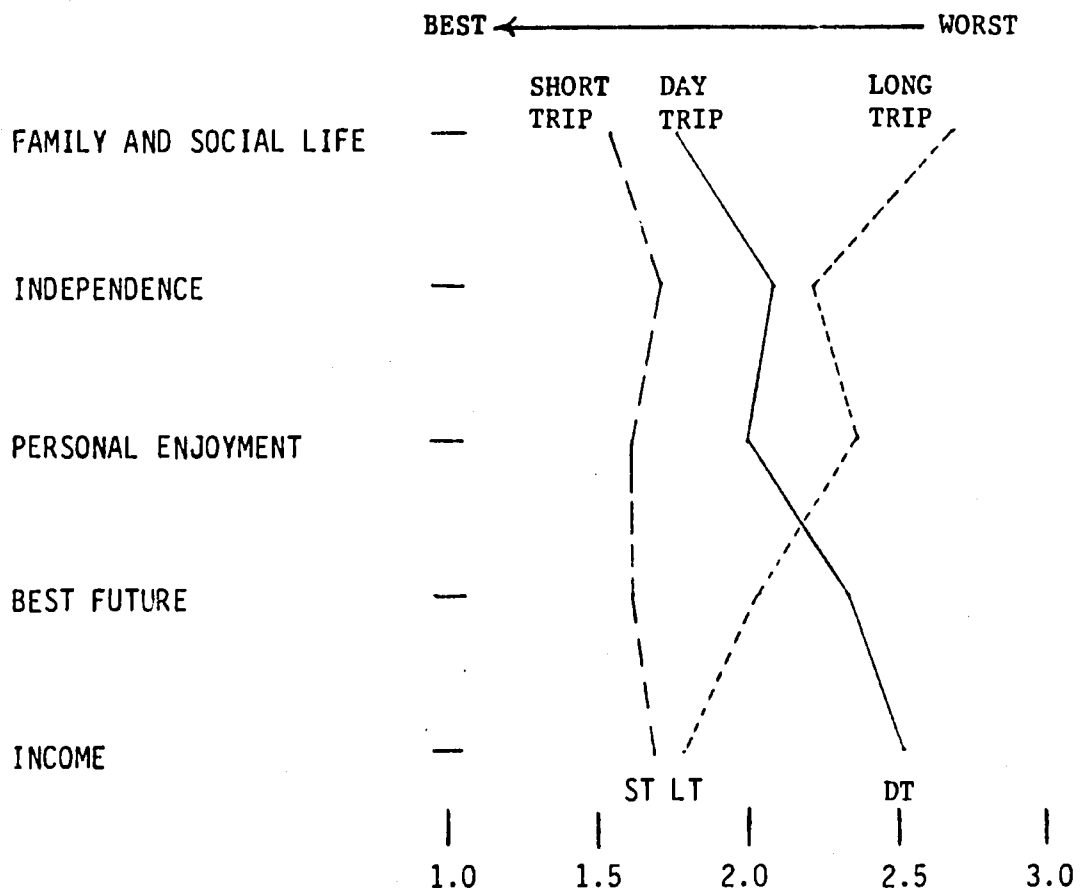


Figure 4. Mean ranks of fishing types on five dimensions by trip length.

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Perceptions of rules as 'bad' or 'unfair' can have several negative socio-cultural consequences, some of which produce negative feedback to the resource management process itself. For example, Miller and Pollnac (1978) and Miller and VanMannen (1979) present a great deal of evidence indicating that the fishermen of Gloucester, Massachusetts held negative perceptions of the Groundfish Management Plan. Other sources (e.g., Appolonio 1978) indicate that these negative reactions to management were quite common throughout the New England fishery. Some of the immediate responses were violations of regulations, which will be considered in more detail below, and falsification of landings records. As Appolonio notes (1978), both the falsification of records and noncompliance distorts the information on which management plans are based; thus, having potentially negative effects on the resource. The problem of falsification of landings data in response to regulation also plagues developing areas of the world, especially where the coastal states lack surveillance and enforcement capabilities (Miles 1981). Once again, the reduction in quality of catch-effort information hinders development of management plans.

Noncompliance with regulations, while an undesirable social impact in itself, also had other negative social consequences. In early 1978, it soon became clear that most violations (some 80 percent) involved vessels owned and operated by recent Italian immigrants. These recent immigrants formed a distinct social group apart from the Italian-American fishermen who had been in the United States for a considerable amount of time (cf. Miller and Pollnac 1978; Miller and VanMannen 1979). A great deal of conflict soon developed between those obeying and those breaking the rules--the former being economically hurt while being scorned by the latter who were apparently getting away with the violations due to delays in enforcement. Thus, the violations divided the community into two potentially violent factions.

Breaking the law, however, has broader, and perhaps socially more significant consequences--an atmosphere of lawlessness or alienation from the 'unfair' system can develop. In most fishing communities, a vessel's status as a "highliner" is based on its captain's and crew's ability to consistently land more fish than its rivals. The quotas and trip limits imposed by management undermined this status system, especially in a situation of extensive noncompliance. As Miller and Pollnac (1978) note, a new status system developed--the new highliners know when and how to break the law. This mass alienation from the system, of course, produces a feedback which results in even more negative perceptions of the management scheme and falsification of data--all of which is contrary to the goals of effective management. The relationships between the variables discussed thus far in this section are illustrated in Figure 5.

What aspects of management resulted in these problems? As noted above, the New England Groundfish Management Plan was immediately perceived to have, and actually had a negative impact on income for some fishermen. Additionally, as noted above, the regulations had differential impact on different categories of vessels in the fishery; thus affecting the structure of the fishery. Further, some fishermen felt that the regulations would force them out of fishing. The combination of both real and perceived problems with the management plan resulted in an overall negative perception of the regulations.

Some of the negative perceptions of the rules may have also been the result of problems in communication between the managers and the fishermen. Early in the management process, fishermen complained that there were more fish off the North East Coast than the scientists claimed, and that the biologists will not listen to a fisherman. Observations made at meetings during which National Marine Fisheries Service spokesmen tried to overcome these problems suggest that the early attempts simply increased scepticism among the fishermen. Fishermen perceived the NMFS

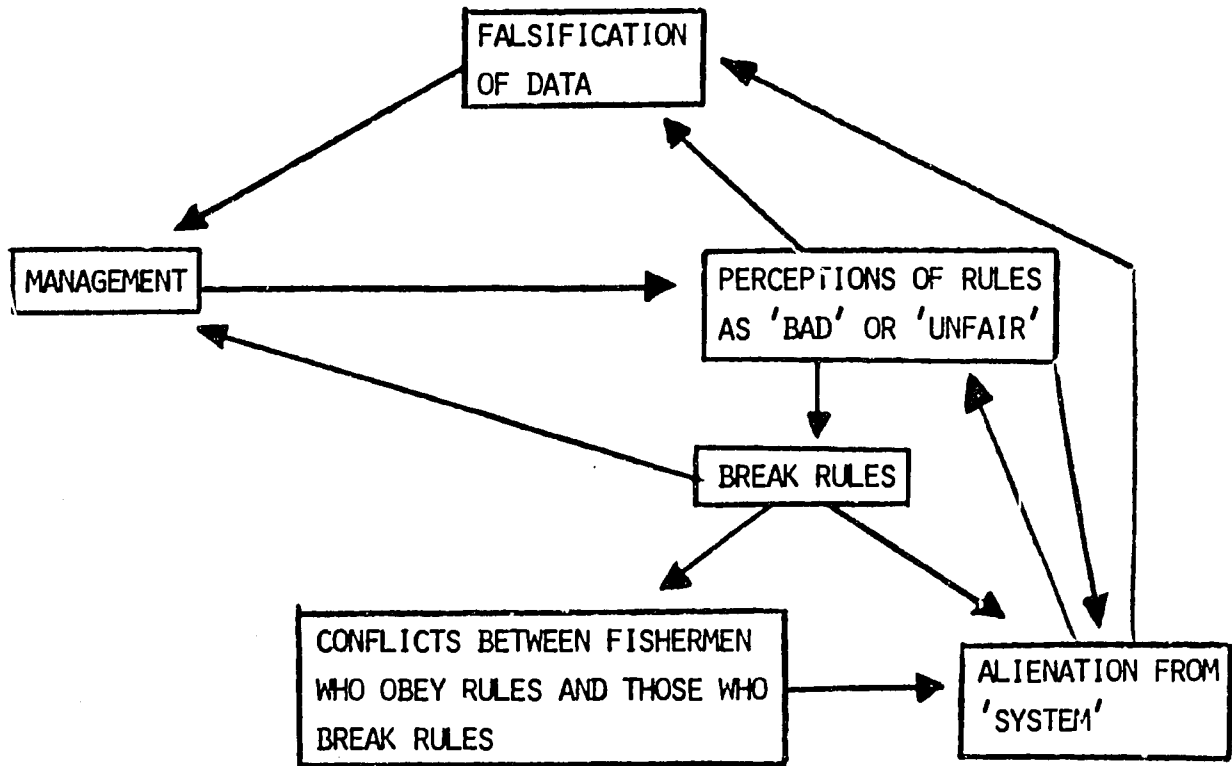


Figure 5. Relationship between fishermen's negative perceptions of management plans and illegal or socially disruptive behavior.

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scientists as "talking down" to them. Remarks such as "Christ, you ask them one question, and they answer another. Don't they understand English?" were commonly heard. Fishermen also complained that they either did not hear about or had to miss a fishery meeting that might affect them due to the length of time they spend at sea. These problems were probably exacerbated in Gloucester and New Bedford due to the fact that a number of fishermen either have not or just recently learned English.

Even the New England Regional Fishery Management Council meetings, which were designed to permit public participation, unwittingly contributed to the communication gap. Smith (ND) notes that the public address system and acoustics of the meeting room were so bad at early meetings that individuals at the rear of the room had problems hearing. The communication gap was only widened when a member of the audience complained and was told by a council member "Why don't you clean the dirt out of your ears?" (Smith N.D.:31). Smith also notes that private conversations among council members and staff during meetings were viewed with suspicion by fishermen in the audience. This was especially true when they thought that their participation was meaningless, as illustrated by several statements made by fishermen and quoted in Smith (N.D.:34).

"What the hell, this is the last time I come; I might as well stop wasting my time."

"It figures--you can always tell something's in the wind when you see Wiley Willie...start to move around."

Smith further notes that other problems in communication result from the fishermen's lack of experience in verbal exchanges in a public meeting where the 'rules' favor the format commonly used by scientists and administrators. That the communication gap was also perceived by participants is clearly supported by Smith's overhearing an industry representative say, "They just don't understand; We don't even talk the same language (N.D.:52).

It thus appears that some negative perceptions of fishery management plans result from failure to take account of socio-economic variables, differences in perceptions of fishermen and planners, and problems in communication. In general, these difficulties can be, in part, attributed to sociocultural aspects of the management planning and implementation process.

III. SOCIOCULTURAL ASPECTS OF MANAGEMENT PLANNING AND IMPLEMENTATION

"If the organization of this kind of management is a difficult problem for the industrial countries, it is an insoluble one for many developing countries without outside help."

--H. H. Bergschmidt (1980:84)

The discussion thus far has focussed primarily on the sociocultural impacts which management may have on fishermen. In the process of outlining these impacts it became clear that they were exacerbated by organizational, and hence social, aspects of the process of management plan development and implementation. As the preceding discussion has made clear, the United States suffered from many apparently organizational problems in the process of developing and implementing fishery management plans. Given the rather extensive staffing of the National Marine Fisheries Service and Regional Fisheries Management Councils in comparison with agencies concerned with fisheries in most developing countries, it is apparent that the task of effective management will be even greater for the LDCs. Many individuals concerned with management have noted the lack of basic data on which management plans must be based, as well as the need for national institutions, research hardware, trained staff, and a surveillance and enforcement capability (e.g., Stoneman & Disney 1980; Bergschmidt 1980; Miles 1981; Johnson 1981). Although many of these deficiencies result from insufficient funding, manpower, and technology, it is possible that a consideration of organizational factors inhibiting or facilitating effective management may lead to a more effective use of available resources.

Organizational Aspects of Plan Development and Implementation

"There is no necessary relationship between the technical soundness or internal coherence of a fisheries plan and the probability that it will be carried out."

--M. Roemer (1978:352)

Although the technical soundness of a fisheries management plan is extremely important, its implementation depends heavily on political and interest group support as well as the coordination of elements of the bureaucracy associated with the fishery. This observation has led Roemer (1978) to suggest that the process of planning is as important as the product.

We noted above that, in part, negative perceptions of management plans developed by the New England Fisheries Management Council were the result of communication gaps. The fishermen and others felt that the National Marine Fishery Service and the Council were not willing to take their viewpoints into account. Through time, however, the industry and the managers adapted to specific communication problems of each other, resulting in more effective transfer of information and less misunderstandings and friction between the two groups. This adaptation took the following two forms: (1) the formation of fishermen's groups with spokesmen who were able to attend meetings that fishermen often missed due to the demands of their occupation; and (2) an apparent change in attitude on the part of the managers indicating that they were willing to consult with the industry. It thus seems clear that the probabilities of implementation can be enhanced by effective communication between planners and groups whose cooperation is essential for implementation; thus, it is essential to identify these groups (Roemer 1978).

Effects of Multiple Agency Involvement in Fishery Management In many LDCs the identification and communication between groups is made vastly more complex by the fact that the scarcity of skilled personnel results in a number of bureaucratic agencies being responsible for different aspects of the fishery. The modern,

more wholistic conceptualization of fisheries management involves aspects of trade and marketing, natural resources, and human institutions such as fishermen's associations and communities. In most LDCs the responsibility for these various concerns are divided between several government agencies. For example, in Morocco, as in many developing countries, there is no ministry of fisheries. Fish marketing is handled by the Office du Commerce Exterieur, social affairs are the responsibility of the Merchant Marine, and the Office National des Poches is responsible to the Prime Minister (Comte 1979). Fisheries offices in many developing countries visited by the author are usually staffed with biologists (sometimes with specialized degrees in marine biology) and clerks who gather and compile statistics. The countries usually do not have enough specialists in marketing, community relations, cooperative development, etc. to have representatives of these disciplines on the fisheries staff; thus, responsibilities are divided between agencies. For effective management these government agencies, with diverse functional responsibilities, must be somehow coordinated. This coordination is critical to the success of the management program.

Hennessy (1981) has argued that an essential feature in development planning is the determination of the administrative feasibility of such inter-agency cooperation. For example, in a recent fishery development project in Costa Rica no less than nine institutions were involved which required coordination (e.g. a bank, government agencies, a fishermen's cooperative, etc., cf. Hennessy 1981). This multiple agency involvement was necessitated by the comprehensive nature of the project which stressed socioeconomic and institutional factors as well as technology transfer. The problem was that adequate authority was not established to coordinate the various agencies, further, the fact that responsibility for the project was at different levels in the various agencies led to status conflicts, delays, and jealousies between individuals and groups involved. All of this, of course, led

to grave problems with respect to project execution. Roemer (1978) has noted that as the number of groups (e.g. agencies, special interest, etc.) involved in the fishery increase, the effective implementation of a management scheme becomes more difficult.

Relative Status of Fishery Office Other problems in management stemming from organizational issues with respect to fishery agencies in LDCs involve the relative status of the fishery office. As noted above, status differences often lead to rivalries and jealousies between agencies which inhibit communication and cooperation. These status differences, however, also result in other problems. Fishery offices in many developing countries are submerged within the ministry of agriculture, natural resources, commerce, etc. Crutchfield and Lawson (1974) note that in many West African countries government capacity in fisheries is limited to the technical, with fishery departments having little, if any political influence in either the government as a whole or the ministry in which they are located. Such a lack of influence inhibits gaining even minimum cooperation from other agencies that are essential in a comprehensive fishery management program. Roemer (1978) has noted that this low status and relative powerlessness can result in inflation of catch statistics as a means of impressing the public, attracting more funds, and increasing the importance of the fishery offices in the administrative hierarchy. The inflation of catch statistics, of course, has a negative influence on the quality of the data base on which fishery management plans are based.

Communication between Managers and the Industry. Agencies responsible for fisheries management in LDCs have immense problems coordinating fishery management plans with local fishermen and dealers due to the fact that individuals in the industry are often scattered all along the coast, often in communities lacking all-weather roads which results in their isolation during the rainy season. This

dispersal also creates problems with respect to accurate data collection. It is for this reason that fishermen's organizations can perform a vital function by enhancing the communication process.

When the Fishery Conservation and Management Act began to make itself felt in the United States, among the first complaints to be voiced by the Northeast coast fishermen were claims that they could not take time off from work to attend public meetings of the management council, that they were not notified of meetings, and that no one at the meetings listened to them anyway. One response to this situation was a proliferation of fishermen's organizations, including fishermen's wives' associations. Further, existing organizations took on the additional function of mediating between individual fishermen and the managers. These organizations served a vital function of both representing fishermen while they were at sea and providing spokesmen with the power of the group of fishermen they represented. These organizations increased the effectiveness of the communication process between the fishermen and the managers, sometimes not to the liking of the managers; but nevertheless, the flow of information was improved along with its potential for increasing the effectiveness of the management process.

The formation of fishermen's organizations in LDCs is not a simple matter. One organization that has had mixed success is the fishermen's cooperative. At the present time, cooperatives are viewed by many as the ideal organizational form to be used in facilitating fisheries development. Although there are some successful fishermen's cooperatives, the failures outnumber the success due to the fact that many planners do not take into account the interrelationships between a new organizational form and the existing society and culture of the small-scale fisherman (cf. Pollnac 1981). Nevertheless, the fishermen's cooperative appears to be the ideal type of association for improving the process of communication between planners and the industry. This is one possible function

of a cooperative that often goes unnoticed among its many others in the development process. Often cooperatives are the only reliable source of catch and effort data (e.g., see Latiff 1976).

Of course, in suggesting that fishermen's cooperatives can be developed to enhance the process of management, we are only adding another level of complexity to the system. In most developing countries, cooperatives are the concern of a government agency apart from the fishery office. We can only suggest that attempts be made to closely coordinate the activities of the two agencies, and that fishery offices work with the cooperative development specialists as a means of insuring that the cooperatives formed are appropriate for fishermen. Pollnac (1981) has indicated that the standard cooperative model is not necessarily adapted to the needs of a fishery and suggests techniques for improving the fit between the organizational form and the small-scale fishing community. Failure to insure organizational appropriateness will likely result in failure--a failure which may have a negative effect on future dealings between the government and fishermen.

It is important to note, however, that fishermen's cooperatives are not the only form of organization that can be useful for management purposes. We noted above that other associations, such as fishermen's wives' associations, also played a significant role in enhancing the communication process between managers and the industry in the Northeast of the United States. Further, a number of traditional communities have developed, through time, their own institutions for resource management which may be of use to planners. In the following section, we will examine some of these traditional resource management techniques and their implications for the planning process.

IV. TRADITIONAL MANAGEMENT TECHNIQUES

"If there is an island somewhere in Oceania where marine resources are conserved more effectively today than they were before European contact, I have not heard of it."

--R. E. Johannes (1978:356)

Lawson (1980) among others has argued that the management and control of the artisanal fishery is an increasingly important area of concern. Inshore fisheries in many countries have been extensively overfished, or have the real potential of being overfished as the numbers of small-scale fishermen increase along with the effectiveness of their technologies. There is a great deal of evidence to the effect that many societies in the recent past have exercised some form of local control over their resources. Some societies still maintain these traditional systems of control. In many areas, however, local management systems have been eroded by the forces of "modernization". Lawson (1980) suggests that a careful examination of these traditional systems of control may yield information useful to resource managers. In some cases, existing systems, which are already accepted by local populations, might be encouraged, therefore taking advantage of a scheme which has been adapted to the local society through years of experience.

Some societies of the world have developed balanced and therefore ecologically successful relationships between fishermen and their resources (Berkes 1977:291). For example, Island communities in Oceania knew their fisheries were not infinite and viewed their marine resources in a very different way from continental societies with plentiful terrestrial food sources and extensive continental shelves (Johannes 1978:350). Many traditional societies, evolving over a long period of time, developed a cultural-ecological balance by integrating a variety of fishery management measures into their social organization. One can find almost any conservation measure (e.g. closed areas, seasons, size limits, etc.) practiced by traditional societies (cf. Johannes 1978). The cumulative effects of regulatory

methods were to stabilize the fishery, obtain high sustained yields, and eliminate overexploitation (Allen 1977:41-42). Furthermore, in some societies, fishermen learned to determine the carrying capacity of an ecosystem, interpret the expansion potential of the fishery, and control the fishing effort accordingly (Cordell 1978:19).

In this section we examine several examples of traditional fishery management methods developed and utilized by a wide variety of societies characterized by both subsistence and market economies and exploiting a variety of environments from the subarctic to tropical. Some of the management methods were difficult to distinguish as several societies utilized more than one type of regulating mechanism; nevertheless, the measures were classified into the following categories: (1) Sea Tenure, (2) Chief Fishermen, (3) Limited Entry, and (4) Cultural Preferences, Religious Beliefs, and Rituals.

Sea Tenure The most common traditional regulatory mechanisms found in the literature fall within the category of sea tenure. They include individual or group ownership of fishing grounds and/or locations for stationary gear, and claimed fishing rights or territories. Sea tenure establishes an "ownership" of marine resources and therefore eliminates the problems associated with common property resources. It is in the best interest of fishermen who control specific areas not to overharvest in order to maintain a sustained level of catch. Brief descriptions of selected sea tenure systems follow.

The Baegu society of Malaita, in the Solomon Islands is divided into groups called the "saltwater" people and "land" people. The reefs and lagoons are under jurisdiction of the "saltwater" people yet specific pools or sections of the reef are owned and controlled by individuals or lineages (Ross 1973:75). The Kwakiutl peoples of the Pacific Northwest allocate their fishing grounds to each subtribe or numaym, the group which formed the basic unit of the society (Pidcocke 1969:136).

In Ivory Coast, fishing areas in the coastal lagoons are owned. Lawson (1980) states that a complex allocation system has developed which is comparable to land tenure distribution systems.

The sea tenure customs of the Maori people of New Zealand are described by Firth (1959:380-381) and Best (1952:270). Each clan (hapu) owns a fishing area which is assigned a special name. These offshore grounds are located by lining up objects on the land, and boundaries are defended vigorously. Other exclusive possessions include fishing stands, shell banks, and places to set eel traps. The entire sea tenure structure constitutes a "system of rights and privileges obedient to the supreme dictates of the tribal welfare"(Firth 1959:382).

Among Indian tribes inhabiting the coastal regions of the straits between Vancouver Island and mainland Canada access to some of the more productive resource sites are restricted by property rights which are owned by extended families and controlled by individuals (Suttles 1974). In one way or another this access is shared with the community as there are different degrees of control. For example, the reef net, placed in the straits is a complex device that has to be carefully made and skillfully operated. The reef net location is therefore always said to be owned and there is considerable jurisdiction over its use. Sturgeon traps of the Musqueam Indians on the other hand, are relatively simple, and the directors of the traps frequently give permission to members of other extended families to help harvest the fish (Suttles 1974:300). Clam beds and duck beds and duck net sites are also owned by extended families yet shared with the community. Unlimited access is provided to all tribe members to fish the weirs and traps for salmon. The entire community helps build the devices and everyone can fish them. There is one limiting factor however, the smoke houses at the weirs are owned by individuals and therefore permission is required in order to preserve the fish (Suttles 1974:300).

Ownership of locations for stationary gear is another type of sea tenure system. Anderson (1973:45-51) describes this system for the cod and pelagic fishermen of Newfoundland, Canada. Obtaining a cod "berth", or area to set a cod trap, is very important to the fishermen of Newfoundland. These locations are allocated in a variety of ways. In some communities traditional ownership of berths is inherited. Other codfishing communities have established rotational systems, informal auctions, and annual draws to determine who will get which berth (Anderson 1973:45; McCay 1976:179). Other stations for devices such as shore seines and traps which are utilized to catch pelagic species (capelain, herring, mackeral, squid) are inherited (Anderson 1973:51).

Claimed territory is yet another type of sea tenure. The lobstermen of Maine claim inshore fishing rights in particular areas and these territories are defended vigorously (Acheson 1975). Claims over ocean territories are directly associated with ownership of land. If a person owns shorefront property or land on an island, he is entitled to "fishing rights" in nearby waters. In the event that an owner does not take advantage of these rights, he may rent out the privilege to local lobstermen, despite the fact that the water is legally in the public domain (Acheson 1975:187). This informal ownership of lobster fishing grounds is not recognized by the state of Maine, but it has served as a definite regulating mechanism within the lobster fishery. This illustrates that extra-legal regulations can evolve within the social organization of a modern society.

The net fishermen of North Eastern Brazil also use territorial rights to regulate their fishery. They decrease competition among fishermen by defining temporary territorial claims to net casting areas (Cordell 1978:19). "The timing of all fishing operations was enclosed in a lunar calendar...culturally shared four-dimensional mental map of the fishing grounds which synchronized boat movements, choice of fishing methods, and availability of fishing spots according to

bi-weekly and daily fluctuations" (Cordell 1978:29). The entire cultural-ecological system that evolved was reinforced with a strict ethic of cooperation which placed a high value on mutual trust and respect (Cordell 1973:30).

Along the coast of Sumatra, fishermen obtained fishing rights by means of an auction. Each year the community government would auction off rights to exploit sections of the river as well as areas of the ocean out to three miles from shore. Other use rights auctioned included the right to fish from platforms, to drop nets from a frame, to use a motor powered fishing boat, and to use a sail powered vessel (Collier 1978:48).

Associated with sea tenure, is regulation of access to the water or the resource itself. In the Sri Lanka beach sein fishery, there are many more nets than can be used in one day. According to customary law, all fishing nets were named and a specific sequence was established in order to give every net owner an equal opportunity to partake in the fishery. Each owner knew the names of the nets immediately preceding and following their own in the sequence, and each fishing site was controlled by a kinship group (Alexander 1980). Anderson (1973:45) states that Newfoundland fishermen do not as a rule manage their resources, but manage space-the points of privileged access to the resource. The control mechanisms devised by small populations of inshore fishermen involved rights to access and boundary delimitation between the waters of adjacent communities. The fishermen vied for space within "their" own waters and consequently limited competition and minimized conflict. The raft fishermen of North East Brazil minimize conflict by an elaborate spacing system based on named fishing grounds and landmarks. The locations of these grounds are kept secret by the individual fishermen, thus providing temporary property rights (Forman 1970:65).

In sum, sea tenure has been utilized by several societies in order to establish private ownership of otherwise common property resources. The private ownership and spacing of fishing areas resulted in minimized conflict, decreased competition, a sense of cooperation, and incentives to conserve the resources.

Chief Fishermen

In many societies, a chief fisherman or other authority figure has jurisdiction over the fishery and acts as a regulator/manager. In Ghana the chief fisherman, elected by the fishing community, plays an important role in the control and management of the coastal fisheries (Lawson 1980). His duties include "1) supervision of the internal organization of the fishing industry (settle disputes and maintain order), 2) collection of beach fees from migrant fishermen, and 3) supervision of religious festival and customs associated with fishing" (Lawson and Kwei 1974:59-60).

As mentioned above, use rights for river and ocean fishing are auctioned off in Sumatra. The individual who wins the auction (called the Pak Lelang) also wins the right to manage the resources of the area for one year. The Pak Lelang has a group of people to help him manage his territory which involves collecting user fees and buying fish from individuals who harvest within the specific area (Collier 1978).

Several of the Maori fisheries were also controlled by a chief fisherman who had authority over deep waters. During seining operations, the chief would climb a pole and shout orders of when to surround a school of fish. During the shark season, the chief established the days sharks would be hunted, kept fishing camps informed, gave signals to assemble, and gave the final command to charge after the sharks. Several traditional customs and regulations regarding shark fishing were strictly observed by the fishermen and enforced by the chief.

Limited Entry

Limiting the number of people entering the fishery is yet another way to help control fishing pressure. In Maine, anyone who has a lobster license can legally fish for lobster. In reality, an individual must be accepted by the men already fishing out of a particular port. Once accepted by the "harbor gang", the newcomer is ordinarily allowed to fish only in the traditional territory of that harbor. Those who do not follow these customs are met with verbal abuse and/or destruction of gear (Acheson 1975:187).

Other barriers to entry may include initiation rights and required apprenticeships. In Moala, women participate in most fishing activities which include gathering of seaslugs, prawns, mussels, crabs, and shellfish; diving; fish poisoning; and communal netting on reefs. Before a girl is allowed to fish with the women, she must undergo a ritual "ocean bath". During the ceremony on the reef, the girl wears a dress given to her by her maternal relations. When she returns to shore, a paternal kinswoman presents her with a new dress and all partake in a feast. Afterwards the young girl is allowed to fish with the women of the community (Sahlins 1962:188).

In Ghana, a potential recruit to the occupation of fishing must be approved by a master of a canoe. The prospective apprentice must then be taken by his father to meet the chief fisherman. Money is exchanged between the father and both the canoe master and the chief fisherman and the trainee works on the beach for at least three months before going to sea (Lawson and Kwei 1974).

The North East Brazilian canoe fishermen limit the number of fishing apprenticeships. Boat captains control this aspect of the fishery and pass on the knowledge and skills of exploiting the stocks to a chosen few, so that a limited number of apprentices will become proficient net casting specialists (Cordell 1978:19). In Oceania, fishermen pass on important information regarding conserva-

tion of fisheries to their apprentices. Their teachings emphasized that it is wasteful to catch more than is needed. They also stressed the importance of letting some fish escape from their nets in order to provide a continued breeding stock (Johannes 1978:353).

Cultural Preferences, Religious Beliefs, and Rituals

Cultural preferences, religious beliefs, and ritual actions of some maritime societies can yield practical ecological consequences (Johannes 1978). For example, certain species of marine organisms may be taboo and therefore conserved in the process. Diet preferences also determine the intensity by which certain species are exploited. For example, among the Miskito of Nicaragua harvesting efforts concentrate on animals which are classified as "meat", the most important food which is used in exchange practices. Green turtle, manatee, and fish such as catfish and mojarra are the marine animals in this category. Shellfish and other species of fish are considered of less importance and therefore are not intensively harvested (Nietschmann 1972). The resources that are culturally selected for consumption by the Miskito Indians are highly diverse and harvesting sites are located over a large area; therefore, harvesting of these species produces minimal ecological disruption (Nietschmann 1973).

Bobby Gaigo, a native of Tatana Village in Melanesia, describes the importance of his people's respect for animals they harvested and the simple methods they used in their community. "In the old days people followed the customary fishing laws and there were always plenty of fish. Simple methods were used. If a dugong was caught it was an important occasion with the singing of sad songs because people had respect for the animal...Fishing is very much a part of the personal, social, and spiritual beliefs of our people" (Gaigo 1977:17b). Similar respect for large sea mammals, especially the whale, is found among the Eskimo (Chance 1966).

Belief in the supernatural is also an important force influencing fishermen of Ghana (Lawson and Kwei 1974:62). They believe that the sea and their vessels have spirits which determine the safety and success of the fishermen, behavior of the tides and weather as well as the quantity of fish in the sea. Tuesdays are set aside in Ghana to pay reverence to the many fish shrines and therefore no fishing takes place this one day a week.

Summary

In sum, these traditional fisheries management systems have emanated from within maritime communities as an integral part of their adaptation to their marine environment. In general, these management mechanisms have stabilized the fisheries into "adaptive economic routines" (Cordell 1973:32) by establishing an orderly process of allocating fishing opportunities. Such opportunities include entry into the fishery, individual or group space on the water, territory for stationary gear, actual use of gear, etc. Therefore the number of participants in, and the timing, spacing, and/or volume of the harvest have been regulated. These methods have been successful in controlling and managing the fisheries and fishermen, and the benefits are severalfold. They include the following:

- 1) Fishing effort has been restricted.
- 2) Conflict and competition between fishermen has been reduced.
- 3) Cooperation between fishermen has been encouraged.
- 4) Equitable distribution of fishing opportunities has resulted.
- 5) Individual benefits to fishermen have been maintained.
- 6) Harvest levels have been controlled.
- 7) Stocks have not been depleted

The major implication of these methods has been that sustained yields of these fisheries have been maintained and therefore reliable, long term continuity of protein-rich resources have been available to these people.

V. SUMMARY AND CONCLUSIONS

In sum, we have examined specific sociocultural impacts of management decisions and outlined data needs concerning these impacts. Suggestions were made concerning the integration of sociocultural data with bio-economic data as a means for developing models to quantitatively evaluate tradeoffs between biological, social, and economic aspects of management. Relevant aspects of the social environment of the development and implementation of fisheries management plans were also examined in an attempt to outline factors which could facilitate the process. Finally, traditional techniques of fisheries management were described as a means of indicating that, in some cases, effective systems have been developed by local fishermen, and that managers should use and/or learn from these systems wherever possible since they have been adapted to local needs through years of experimentation.

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