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# ANTHROPOLOGY OF FISHING

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*James M. Acheson*

Department of Anthropology, University of Maine, Orono, Maine 04469

## INTRODUCTION

Anthropologists interested in "maritime anthropology" have focused on three subjects: modern fisheries, shipboard life, and prehistoric marine adaptations. In this age of proliferating subspecialties, it will come as no surprise to learn that the practitioners in these areas comprise three exclusive "clubs" whose members are scarcely aware of each other's existence. While this review will concentrate on the work of those maritime specialists interested in modern fisheries, it will include references to work done by members of the other two "clubs" when their work can illuminate particular issues of importance.

What are the major contributions of maritime anthropology? Some anthropologists say there are none, and that such studies have nothing in common but water (223). Bernard (41, pp. 478-79), for example, argues that "maritime anthropology" is "far-fetched" in that it has no focus and has produced few "generalizations increasing our understanding of man." Studies in this field, he claims, could better be classified as "plain old ethnology, archaeology, linguistics, or physical anthropology with no loss of generality." M. E. Smith (223) contests Bernard's assertions, arguing that the proliferation of subspecialties such as maritime anthropology are inevitable given the lack of a theoretical focus in anthropology as a whole. She goes on to produce a long list of generalizations and "ethnographic elements" significant in both maritime and fishing communities (223, pp. 4-5). I agree with Smith that there are some clear threads running through the anthropological literature on fishing. To be sure, there are anthropological studies on a variety of topics in communities where people do some fishing. Such studies clearly belong in archaeology, physical anthropology, or other subareas of social anthropology. But fishing poses similar problems the world over, and the significant contributions of the anthropology of fishing have stemmed from studies focusing on the way that human beings have adapted to earning a living in the marine environment. Most of the contri-

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butions of this field have been made by anthropologists studying what happens on board ships and in the fishing industry—not by shore-based studies of fishing communities.

Fishing takes place in a very heterogeneous and uncertain environment (25, 159, 248). This uncertainty stems not only from the physical environment, but also from the social environment in which fishing takes place.

The sea is a dangerous and alien environment, and one in which man is poorly equipped to survive. It is a realm that man enters only with the support of artificial devices (i.e. boats, canoes, platforms, scuba gear, or other technologies), and then only when weather and sea conditions allow. The constant threat of storm, accident, or mechanical failure makes fishing at sea a very dangerous occupation anywhere in the world (39, 69, 79, 142, 158, 209). The fishing gear used must be "adapted to aquatic conditions," which means that "fishing devices are not simply transferences of land hunting devices, and that many technological features of fishing gear never appear in hunting devices used outside of the water" (102, p. 239). The intertidal zone is not as dangerous as open ocean, but even here people must retreat in the face of the incoming tide, and the tools and techniques designed for land will not work here.

Marine ecozones typically contain very large numbers of species (70, 81) with different habits and requiring different capture techniques. Thus, the fishermen of a single culture must be adept at several different fishing techniques (228). Many species are only available periodically. Not only do many species migrate seasonally, but fish populations can increase or decrease drastically in ways which are difficult for even trained fisheries scientists to predict (62, 70, 128). Widespread economic disaster, following on the heels of stock failure, is far from unknown (106).

The fact that fishermen are operating on a flat, undifferentiated surface and are exploiting animals that are difficult to see increases uncertainty (180). For fishermen, locating one's position is always problematic; and it is much more difficult—perhaps impossible—for the fisherman to learn as much about desirable species as the hunter and farmer, who can closely observe the animals and plants they exploit (223). In addition, one's catches can fluctuate depending on the activities of fellow fishermen, and even fishermen working with relatively primitive technology can affect the stocks of aquatic animals (18, 82, 149, 150, 212). In many fish markets of the world, prices fluctuate wildly so that a good catch does not always mean a good day's income (31, 157, 247).

Geographers such as Sauer (208, p. 309) have argued that before the advent of agriculture, the seas provided man with a "continuous" and "inexhaustible" supply of food. The long-run stability of marine organisms may have provided man with unusual opportunities for settlement. How-

ever, the evidence from modern social anthropology is that the sea's largesse is notoriously undependable in the short run, and biologists have stressed that industrialized fishermen are all too capable of exhausting it.

The fact that many fishermen work long hours on crowded boats in an all-male environment far from home causes physical and psychological problems for them and their families from whom they are separated (35, 53, 233). More important, it forces both fishermen and their families to play roles that are often not standard in the culture from which they come. The men must organize effective work groups and maintain privacy; the women must bring up families and run households with their men gone much of the time (28). It is not surprising that fishing selects for different psychological characteristics than land-based occupations in the same culture (177), and that there are problems recruiting people in some fisheries (33, 131, 186, 187).

Since fishermen are absent so much of the time, they are often unrepresented in the political arena and are usually dependent on middlemen and ship owners (79, 247) who are often in a position to exploit them (154).

Most important, fish are a common property resource. There is a growing body of literature demonstrating that resources of all kinds owned by the public (i.e. air, rivers, grazing land, oceans) are overexploited and abused in ways that do not occur with privately owned resources. Private property is protected and maintained by its owners, who, after all, obtain benefits of any investment they make. By way of contrast, those depending on common property resources are locked into a system in which it is only logical that they increase their exploitation without limit (99). Why should fishermen conserve when there is no way the benefits can be reserved for themselves? This introduces uncertainty in both the short run and long run. In the short run, it means that a fisherman's physical output is dependent not just on the resource, but on the uncertain actions of other fishermen (24). In the long run, it means fishermen live with the specter of complete stock failure.

In summary, fishing poses some very unusual constraints and problems. Marine adaptations are one of the most extreme achieved by man. The primary contribution of the group of anthropologists studying fishing has been to produce a body of literature and set of concepts on the way people have solved the problems posed by earning a living in this uncertain and risky environment.

## RESPONSE TO UNCERTAINTY: INSTITUTIONS AND CLUSTERS

While fishermen cannot control the weather and location of fish, they can reduce some of the uncertainty of fishing by entering into agreements with

each other. Some of these fishing institutions and norms reduce risk by insuring fishermen some part of the catch or at least a chance to catch fish; others operate to reduce the costs of fishing; and still others to increase revenues from the sale of fish.

### *Crew Organization*

**THE SHARES SYSTEM** The world over, fishing crews are organized to spread the risk of fishing. Fishermen rarely are paid a flat fee or wage; they are ordinarily paid a portion of the catch. This is true in virtually every area of the world—from Canada (49), Sweden (122), to Mexico (133), Sri Lanka (18), Ecuador (138), and Ghana (59). This effectively increases the motivation of the crew by making them partners in the enterprise, and reduces the risk for boat owners by ensuring that they will not have to pay fixed wages if catches are poor (83). The principles on which shares are allocated vary somewhat. In virtually all societies, shares of fish are allocated to both labor and capital. In most peasant societies where capital requirements are small, each crewman obtains an equal share, and one or two shares are reserved for the boat and equipment (83, 198). As total investment in boat and fishing equipment increases, a larger number of shares are reserved for the boat owner(s) (122, 204). In some societies, increased shares are allocated to individuals on the basis of age and experience (49); in other cases all share equally regardless of experience (122). In some instances where fishing success depends on highly skilled specialists, these specialists will receive a higher percentage of the catch (197, 242). Two effects of the shares system should be noted. First, since a crewman's earnings depend on the success of the boat, there is a tendency for the best crewmen to seek out the most successful captains. This exacerbates competition between captains of fishing vessels and contributes to crew instability (36, 112, 117). Second, it is said to inhibit capital investment, because boat owners and investors do not receive full returns on the investment they make. That is, the owner pays all costs of investment, but the crew receives part of the increases in catch that result (20).

**EGALITARIAN EMPHASIS** Relationships among crew members on fishing boats are remarkably egalitarian, from Europe (56, 122) and Latin America (34, 114, 204) to Asia (48, 54, 73). All fishing vessels have captains or skippers because the need to coordinate activities and make definite decisions is ever present, but in many crews, the captain's authority is rarely exercised: "The ideal skipper-crew relationship is one where crewmen remarked of the skipper that 'he's so quiet, you hardly know the man is up there' [in the wheelhouse] or 'he hardly says a word,' and orders rarely have

to be given" (25, p. 219). Much the same situation exists on Puluwat, where T. Gladwin (95) reports that the captain pays attention to the suggestions of the crew members. Several anthropologists have commented on the need for "voluntary cooperation" among crews (21; 242, p. 107) "which generates more egalitarian relations between the crew and those in command."

Several different hypotheses have been proposed to account for this phenomenon. First, Barth (36) argues that this egalitarian emphasis is related to the need for a well-trained, committed crew. He notes that as the need for a trained crew increased, the captain and crew became more equal. Barth (36) writes that when purse seines were introduced into the Norwegian herring industry, captains entered into a series of transactions with their crews in which they relinquished some of their traditional authority in exchange for greater commitment and performance, resulting in higher catches (36, 192).

Norr & Norr (154) and Pollnac (180) argue that the egalitarian nature of crews is directly related to the risks. That is, the need for coordination of fishing crews to avoid disaster and increase fishing effectiveness increases the importance of each worker. In addition, "fishing entails higher risk of equipment loss," which increases economic mobility among fishermen and reduces social distance between fishing boat owners and crew (157). Egalitarian relationships are also congruent with the shares system. After all, a crew is a group of "co-adventurers" (25)—not wage earners.

**CREW RECRUITMENT AND KINSHIP** Much of the literature on crew organization centers on the problem of recruitment—that is, the way owners of vessels attract crews, and the relationship between owners and crewmen. Here the question of kinship is of paramount concern since many crews—particularly in the inshore artisanal fisheries—are organized around a core of kinsmen.

Wide variation exists in the organization of ship's crews, however. In a few cases, crews consist primarily of friends (73, 91) or nonkinsmen (112). In a very few societies at the other extreme, crewmen typically are close kinsmen, as is the case in the Newfoundland ports described by Nemeč (147), Faris (77), and Firestone (78). It is more usual for crews to exhibit great flexibility and variation in recruitment patterns and to involve both kin and nonkinsmen.

Where crews are composed mainly of kinsmen, it is typical that the boat owner is granted great flexibility in recruiting them. In the Faroes (44), crews are typically composed of kin. However, the owner has no obligation to accept or reject kinsmen in certain categories. Here, kinsmen join crews by consciously activating "kith" ties. Thus, kinship does little more than define a social field within which crews are recruited. Stiles (232) argues that

crews in Newfoundland are recruited through both kin ties and contractual ties. There are a "relatively small number of purely familial or contractual crews" (232, p. 206). And McGoodwin (133) states that kin ties are not the structural basis on which Mexican shark fishing crews are formed regardless of what informants say.

The explanations for the fact that crews usually involve different admixtures of kinsmen or nonkinsmen are as various as the authors and societies described. H. Gladwin (91) notes that crews built around cores of kinsmen are more stable than crews without kin linkages. Stiles (232) echoes this theme, hypothesizing that a skipper's primary goal is to recruit a stable crew with the right combination of skills. If he can recruit such a crew from among close agnates, he will do so since he is obligated to give them jobs. But he will not hesitate to obtain crew members via contractual ties if the stability of the crew is threatened. Löfgren (122) emphasizes the great "shock absorbing" capacity of family fishing firms faced with uncertain, fluctuating incomes, problems obtaining crews, and difficulty obtaining capital. Breton (49) argues that organizers of work groups in one French-Canadian fishing village choose agnates. However, the percentage of agnatic ties in such groups varies considerably depending on the season of the year, the task, and the lineality of the corporate group involved. Orbach (159, p. 168) notes that tuna boat skippers in San Diego choose crewmen from among "their friends and relations"; with refreshing candor he admits that the reason is unclear, although he suspects access to information about crew vacancies is an important factor.

Two themes crop up repeatedly in the literature which have strong bearing on the recruitment issue. First, being at sea for long periods of time puts crewmen under psychological stress. Although the amount of stress might be relatively small in non-Western cultures where people have personality traits preadapting them to long times at sea (94), it is severe in the case of crews from Western nations (35, 103). As a result, crews of vessels from Western nations have evolved a variety of norms, interactional patterns, and spacing mechanisms to give some semblance of privacy (42, 101, 117). Second, the safety and effectiveness of a vessel depend on the ability of a crew to work together (198, 204). For this reason it is critical to choose crewmen who are compatible with each other (159). This goal is most likely to be achieved if recruitment procedures are very flexible.

### *Access to Fishing Rights*

In some societies, fisheries resources are truly a common property resource. Several authors reporting on widely scattered places in the world have noted that fishermen can fish where they want and that there is no ownership of

fish resources (72, 80). However, there is a burgeoning body of literature demonstrating that in many diverse societies, fishermen do have established ownership rights to marine resources (52, 57, 109, 110).

Several authors have noted instances where fishing spots are not formally owned, but where secrecy and information management operate to effect some property rights over resources (21, 82, 83, 122, 235). In a few instances, certain boat crews have de facto rights to specific niches and ecozones since they are the only ones in the area which have the technology to fish them (64, 122). McCay (130, p. 399) points out that in most societies fishing rights involve control over "fishing space"—not the resource itself. However, such a wide variety of types of sea tenure systems have been reported that it is difficult to generalize about them.

In some instances temporary usufruct rights to choice fishing spots are allocated to the boat that reaches the fishing grounds first (51); in others, fishermen are organized in ways which allow different crews to take turns exploiting choice spots (56). Sometimes outsiders cannot be excluded from certain fishing grounds, but they can be forced to abide by local norms (129); in other cases fishing territories are defended in various ways and outsiders are completely excluded (2, 3, 7, 119). In many cases, rights to fishing grounds are recognized and controlled by the government as is the case in Japan (153) and Sweden (123); in other cultures such rights are completely unrecognized by the government and are defended by "illegal tactics" (7). Ownership rights often last throughout the year, but in a few areas there is freedom from competition only during certain seasons (24, 129). Fishing areas are occasionally owned by individuals, as is the case among the Salish (237) and on the Baltic (123), but in most areas of the world, they are owned communally (2, 7, 27, 37, 129, 150, 152, 156). In parts of Oceania, fishing rights are owned by groups, although access to them is controlled by leaders (109, 207).

Despite the variations, it is clear that in many fishing societies in the world, rights to fish are controlled and fishing territories are not common property resources. Such ownership rights clearly operate to reduce uncertainty. If fishermen cannot control the fish, at least they can control who will be allowed to fish for them, and how they will do so. It is very clear also that territoriality in most fishing communities has as its goal "access rights—privileged space" (27, p. 63). The object is not to protect or conserve the fish as much as to reserve the fish that are there for one's self.

### *Markets and Fish Buyers*

In most parts of the world, fishermen and middlemen establish strong and long-lasting relationships. There are two reasons for this pattern. First, it is very difficult for fishermen to market their own catches successfully. Not

only must fishermen be physically absent a good deal of the time, but they operate on schedules which are simply not compatible with the opening and closing of markets on shore. As White points out, fishermen are not oriented to an ordinary business schedule, but to a world in which time is reckoned in terms of trips and tows, and in which one's schedule and decisions depend on the habits of the animal and the weather (245). In addition, success in marketing fish requires a good deal of specialized knowledge of various markets and an ability to predict the fluctuations of prices for various species of fish in different locations (93, 199). There is no room for delay or indecision, given the highly perishable nature of the product, "Hence the tendency to a greater development of middlemen who take these matters off his [the fisherman's] hands" (79, p. 27).

Second, and more important, fishermen establish long-lasting ties with middlemen to reduce the uncertainty of marketing fish and obtaining capital. The reasons fishermen have problems obtaining capital are fairly obvious. Not only can boats be moved and be lost in storms, but boats and fishing gear depreciate rapidly (157). Thus it is difficult to use them as collateral.

The reasons for the instability of fish prices are more difficult to understand. The facts are that many fish markets have a history of periodic shortages and gluts (157). Sometimes prices change so unpredictably that fishermen do not know how much money they will receive for their catch when they leave port. Fishermen often see these unfortunate fluctuations as the result of a conspiracy among dealers; and such conspiracies have been well documented from time to time (45, 236). But there are economic forces involved as well. Part of the price instability can be traced to the periodic availability of various species of fish. Perhaps a more important factor is the nature of the demand curves involved. In many parts of the world, the demand for many species appears to be highly inelastic (e.g. 132). This means that a change in quantity of fish will bring a more than proportional change in the price. In some areas, the inelasticity of demand is due to the fact that fish cannot be stored for long and thus are sold mainly in small local markets, which can become saturated quickly (76, 79, 83). In the United States, inelasticity of demand is traceable to the fact that approximately 80 percent of the catch is consumed by restaurants and other institutions (15). These institutions purchase a constant supply and charge the same amount for it regardless of catches or seasonal variations, due, in part, to a reluctance to reprint menus. As a result, when there are large supplies of fish, warehouses fill up even if prices for fish are lowered. At such times, dealers do not say they will buy no more fish; they merely lower the price they will pay to an absurdly low level which says the same thing (247). As a result, all of the risks of production are passed back on the fisherman who

must not only put up with the uncertain catches, but uncertain prices for the fish he does catch.

Fishermen establish many different kinds of ties with middlemen to spread and/or reduce these risks. In many tribal and peasant fishing societies, the marketing is done by women (59, 83, 85, 91, 156). In Ghana women fish traders are reported to be very efficient and able (92). In some cases, the men of the family fish and the women are fish sellers. Forman argues, somewhat enigmatically, that such arrangements keep profits in the family (83); while Christensen (59) points out that men prefer female kinsmen to sell their fish because they are more trustworthy.

In tribal and peasant societies, capital is obtained in a variety of ways. In some fishing societies, the boat and fishing equipment are owned by members of the crew (18, 85, 146, 147). In other cases, fishing vessels are owned jointly by lineage members (80, 119). However, it is very common for fishermen to obtain capital by borrowing from businessmen and others outside the fishing industry (79). In these kinds of cases, such arrangements not only make it easier to amass capital, but spread the risks among many individuals.

In many instances, fishermen establish ties to fish dealers which serve both to facilitate marketing and to amass capital. Such long-term ties have been noted in peasant societies (e.g. 243) and are very common in fishing communities in modern Western countries.

In the United States such arrangements operate so that the dealer obtains a steady supply of fish—his primary goal. The fisherman might receive access to credit, capital for long-term investment, a secure market for his fish, preferential prices for his catch, and valuable knowledge about market conditions (236, 247, 248). Exactly what the fisherman receives depends on a variety of factors such as the amount of fish the fisherman can supply, the length of time the two have been doing business and the degree of trust built up. Fishermen and dealers who cannot or are unable to establish such long-term relationships are at a distinct disadvantage (247).

Long-standing relationships between buyers and sellers have been noted in the ethnography of several different parts of the world (88, 127, 141). Thus, it is scarcely surprising to the anthropologist that fishermen would establish long-standing ties with one dealer rather than sell to the highest bidder. For economists, such cases are more shocking. They indicate an "impaired" market and are further evidence of a fundamental weakness in the neoclassical model of economics (247).

In some fisheries in New England, the benefits of these long-standing relationships between fishermen and middlemen appear to accrue to both equally. In other fishing communities this is not true. In Sri Lanka, fish dealers use violence or the threat of violence against fishermen and competi-

tors alike to maintain control over local fish markets, which, of course, results in fishermen receiving very low prices for their catches (19). Faris writes that until recently, the fishermen of Cat Harbor, Newfoundland, exchanged their fish annually with merchants who extended them credit on terms that made certain the fishermen would never be out of debt. Thus they were never free to sell their fish to whomever they desired. (77). Ward (243) writes that the creditor-debtor relationship in Hong Kong often worked to the detriment of the fishermen. In a similar vein, Löfgren (123) reports that Swedish fishermen were dependent clients of fish merchants.

Two related hypotheses have been suggested to account for this phenomenon. First, it has been suggested that the power of buyers is increased if they are able to establish a monopsony and control the transportation system (19, 50, 247).

Second, Löfgren suggests that middlemen are able to take advantage when fishermen are unable to withhold their catches and their "bargaining position is weak" (123, p. 104). The data from New England buttress this hypothesis. Maine lobstermen, who can store live lobsters for months in pounds or "cars," drive a far harder bargain with dealers than the Maine groundfishermen who must sell small perishable catches through an "out of state" broker under circumstances where they cannot personally supervise the sale (248).

### *Cooperatives*

At present, in many scattered parts of the world, fishermen are joining cooperatives. The impetus for the cooperative movement has been increased in recent years by the policies of international and governmental development agencies who tend to see cooperatives as a general solution to many of the problems of small-scale fisheries (183, 205). Generally cooperatives are designed to provide many of the same services fish dealers do under ideal circumstances (i.e. a steady market for fish; fair prices for fish; credit, supplies, and bait at reasonable prices; information about the market) (56, 76, 161, 177, 205). As Poggie & Gersuny (177) make clear, the avowed objective of forming many cooperatives is to reduce risk and uncertainty. Cooperatives tend to be formed when fishermen have been or feel badly used by buyers, and join together to get fairer prices and steadier markets for their fish (56, 175). They are also formed when outside entrepreneurs begin to invest heavily in the fishing industry, which as Norr & Norr (155) point out, leads to control "by nonfishermen." In short, cooperatives are often formed as a strategy to regain control over capital equipment and maintain independence, not just to gain competitive prices for fish.

At times cooperatives can be used for other purposes as well. McCay (132) describes a case in New Jersey in which a cooperative with limited

membership instituted a catch quota system which not only gives control over prices, but operates to conserve the fish resource as well.

Despite the potential advantages, some fishing cooperatives have been successful and others have not. As Pollnac & Carmo (183) point out, the success or failure of cooperatives is due to such a large number of factors that generalization is difficult. Several themes appear repeatedly in the literature on successful cooperatives. Cooperatives tend to succeed when fishermen gain benefits in terms of better prices, favorable loans, services at reasonable fees (161, 174), more stable supplies of fish and stabler prices (130, 170), and where the cooperative is organized in a way that the fishermen feel it is theirs (175). There is a much larger and more diffuse literature on the reasons cooperatives fail. Digby (74) believes that lack of competent management is the major factor. Other anthropologists stress that cooperatives fail when they are not organized in ways that are congruent with the "other aspects of the socio-cultural systems" (174, p. 2). For example, Poggie (175, p. 21), argues that "independence is a psychoculturally adaptive characteristic of small-scale fishermen." The success of the Point Judith, R. I. cooperative is due in part to the fact that it is organized "without impinging on independence of individuals," and the failure of the cooperative at Puntarenas, Costa Rica is due to the fact that its "organization is indeed incompatible with this psychological characteristic" (175, p. 24). Sabella (205) has found that the failure of a Peruvian fishing cooperative was due to a combination of ineptitude, poor management, and the fact that its ideology was not in accordance with that of the culture as a whole.

Opposition and sabotage play a role as well. Pollnac (180) argues that cooperatives are often resisted by middlemen who have a great deal to lose if marketing is taken out of their hands. McGoodwin (137, pp. 34-47) traces the failure of a Mexican fisherman's cooperative to a combination of official corruption, lack of autonomy, economic inefficiency, competition from offshore trawlers financed by the government, "an unstable international market," and conflict with the majority of people in the local area. However, Orbach points out that the absence of a cooperative does not always mean helplessness, atomization, and exploitation. In Chesapeake Bay, watermen have used "different organizational forms to achieve their purposes." Cooperatives were only one (161, p. 55). Whatever social form the watermen used, "a significant degree of cooperation was present" (161, p. 55).

### *Miscellaneous Institutions.*

A number of other kinds of institutions are reported from various parts of the world which reduce the uncertainty of fishing in a variety of ways. In many areas, fishermen have informal rules designed to avoid gear conflict,

such as rules concerning positioning of gear (129, 248). Other institutions cut fishing costs [e.g. rules on amount of gear fishermen can use; (3, 4)]. In one Japanese community, where illegal fishing abounds, fishermen have agreed to exchange information about sightings of police patrols. They are also able to agree which days the entire fleet is going to fish. When the weather is threatening, the entire fleet stays in (47), which reduces pressure to fish in bad weather. Among fishermen in many parts of the world, it is obligatory to help each other out in time of disaster, mechanical failure, or similar happenings. McGoodwin (134) reports that Mexican shark fishermen make long-distance crossings together, while Norr (157) notes that fishermen depend on each other's "skill for survival in any crisis at sea." Arrangements of this kind are probably very widespread in fishing communities throughout the world.

### *Fishing Clusters<sup>→ group</sup> and Information Management*

A great deal of anthropological work has been devoted to describing the normative and structural arrangements fishermen in various fishing cultures have developed to reduce uncertainty and spread risks. Fishermen, however, have also developed other, less formal arrangements allowing them to cope with a very uncertain environment. Andersen (21, 25), Wadel (242), Stiles (230), Orbach (159), Stuster (234), and Gatewood (87) have focused on the way communication ties between boats are managed. Wilson & Acheson (248) have developed a more elaborate model concerning relationships between direct competitors in the fishing industry and the effects such competitors have on each other.

Wilson & Acheson (248) argue that fishermen in New England are part of loose networks composed of men who fish for the same species with the same gear in the same area. Such groupings they call "clusters," a term first used by Barth (36). Members of clusters—men who have the same set of feasible options—are constantly in contact with each other and constitute a reference group. Cluster members share a set of rules about the proper ways to fish, and members of these networks obtain two kinds of information from each other: short-run information on the location of species and marketing information; long-run information concerning technical and economic innovations. In both cases, fishermen are reacting to the problem of uncertainty simply by imitating each other—especially their more successful competitors.

Information about location of species is obtained from one's own experience and electronic gear; and also by verbal exchange, observation of other boats, or indirectly (overhearing radio transmission, etc). In clusters exploiting sedentary species, the duration of knowledge is very long so that there is a great deal of secrecy. If one locates a bed of clams or a concentra-

<sup>→ large</sup>tion of lobsters, one can return repeatedly to get them if one keeps their location secret (248). In these fisheries men learn about locations of fish by direct observation or through their own experience (5).

Fishermen in New England are much more likely to exchange accurate information openly about the location of migratory species (248). There is little sense keeping such information secret since fish will not be in a given location long. By exchanging information, fishermen hope others will reciprocate in the future. Such exchanges also greatly increase the total search area.

Such arrangements are found in other migratory fisheries in other areas. In the Pacific tuna industry and the inshore California fishery, for example, groups of fishermen called "code groups" exchange information on catches and location of schools of fish using coded radio messages (159, 234, 235). Gatewood (87) reports that cliques of salmon seiners in Alaska share information from fish "scouting expeditions." The trawler fishery of Newfoundland, where target species are semimigratory, appears to be between these two extremes. Here a few old friends establish "trust exchanges" and give each other factual information on a regular basis. However, Andersen (21, 25) makes it clear that most skippers are involved in both "deceptive" and "nondeceptive" transactions. In Newfoundland, information management involves a delicate balance. While deception is expected, ideally one does not try to hurt others. The information flow is restricted, but one does not tell outright lies either. As Stiles (230, p. 48) phrases it, "no crew can afford to operate in a vacuum because it is both impractical and dangerous to do so, . . ." "The competitors need each other" (28, p. 162) and contribute to each other's success.

Cluster membership also influences information about innovations. Specifically, Wilson & Acheson (248) argue that the adoption of innovations is related to the degree of "cluster packing." In "tightly packed" clusters (i.e. where the technology in use is relatively uniform), fishermen will more likely adopt small, incremental innovations. Large, radical innovations are adopted, if at all, only by fishermen in "loosely packed clusters," in which the set of feasible options for various fishing firms is quite different.

### *Ritual and Magic*

While fishermen can reduce risk and uncertainty through the development of technology, institutions, and communication, the sea is still a dangerous and risky environment for a terrestrial animal such as man. Malinowski (126, 127) first suggested that human beings cope with irreducible risk through ritual and magic. He noted that in the Trobriand Islands no magic exists in lagoon fishing, where reliable catches can be obtained without physical danger, "While in open-sea fishing, full of danger and uncertainty,

there is extensive magical ritual to secure safety and good results" (127, p. 31). Other anthropologists have documented cases in which magic and superstitions in fishing societies are associated with high risk. Johnson (111) argues that a large number of witches were thought to inhabit the environs of a Portuguese fishing community before the advent of motorized fishing craft. When motors were adopted, which made it much safer to negotiate a dangerous bar at the entrance of the harbor, the witches disappeared almost immediately and the level of religious observance declined as well. In addition, both Prins (197) and Watanabe (244) have found a relationship between risk and ritual observances in Kenya and among the Ainu, respectively.

Poggie & Gersuny (176) show that in one area in southern New England, there are many more tabus and rituals among fishermen than among millworkers, who have far safer and more secure jobs. However, they discovered no difference in rituals between lobster fishermen and offshore fishermen; the latter presumably face greater dangers than the former (176, 177). In a methodologically more sophisticated study (179), they demonstrate that the rituals among fishermen are positively associated with length of fishing trips and negatively associated with having been socialized in a fishing family. These results support Malinowski's hypothesis, since fishermen who take long trips are fishing the more dangerous offshore areas. In addition, boys socialized in fishing families have one or more successful role models, which presumably reduces anxiety (179).

The quasi ritual nature of fishing shows in a concern with purity and pollution. In many societies, certain classes of women are proscribed from having contact with boats or boat construction (95, 177). In others, fishermen are not supposed to have contact with women when they are engaged in fishing magic or preparing for fishing trips (54, 119).

In addition, fishermen enter a different realm when they are fishing, and have to be reincorporated into the community when, and if, they return to it. Entry and exit between these two spheres is sometimes accompanied by marked rituals, such as the one described by Johnson (112).

## COMPETITION: POLITICAL PROCESSES AND INDIVIDUAL STRATEGIES

### *Politics and Conflict*

Fishing is not only an uncertain enterprise, but a competitive one. The competition is exacerbated by the free access nature of many fisheries. One response of fishermen has been, as we have seen, to develop a wide variety of norms and institutions to share risks, establish de facto property rights over fish, reduce competition, ensure markets, gain access to information about locations of fish stocks, and so on.

Another response is to use force and political pressure (i.e. regulations) in an attempt to reserve access to the resources. Fishermen have entered the political arena in a number of fishing societies to establish rights to fish or to settle disputes. However, there are so few studies that generalizations are difficult. Some good individual studies exist, however. C. L. Smith (214, 220) provides excellent information on the conflicts that have occurred in the salmon fishery of Oregon and the regulations that resulted. An analysis of the Newfoundland trawlerman's strike in 1974-75 has just appeared (124); Andersen (24) gives general coverage of the various kinds of legal and extra-legal mechanisms used in Newfoundland to avoid conflict and reserve fishing space. Acheson (2, 7) has written on the way Maine lobstermen organize political "teams," which are not recognized by the government, to establish and maintain group-owned fishing areas. Yngvesson (250) has analyzed the way disputes are settled in one fishing community on the Atlantic coast of an industrialized nation. And there are studies concerning the social and economic factors influencing efforts to manage fisheries in Oregon (215, 218) and Maine (4, 9). However, these studies are on such different topics in such widely scattered areas that no attempt can be made to answer questions about political processes and structures in fishing communities as a whole.

Two important kinds of regularities appear to exist across fishing communities. First, in a number of areas there are informal rules concerning the conditions under which gear of different kinds can be used and the way it should be used. These rules obviously minimize conflict (159).

Second, the effects of unconstrained competition and conflict are so costly that fishermen in many locations have organized to have laws passed to limit access to fisheries (7, 26, 58, 129), and fishermen in many societies have been successful in legalizing ownership rights to fixed gear fishing sites (24, 77, 158, 220). In these cases they have political power to be able to accomplish their ends (24, 229) but under other conditions they have not (29).

### *Individual Strategies*

Still another response of fishermen to a situation in which competition is endemic is to compete as effectively as possible. There are four different widely used strategies which have been studied extensively by anthropologists: acquisition of skills, occupational switching, capital management, and innovation.

**SKILL** There is a good deal of evidence from widely scattered fisheries that some men are much more successful in a given season than their competitors who are using the same gear. In Newfoundland, Wadel (242, p. 10) notes that "a single purse seiner may catch as much as five or ten others put together," while the cod fishery is "characterized by striking differences



in catch per unit" (27, p. 49). On the Colombia River "15 percent of the fishermen harvested 50 percent of the total value of landings" (219, p. 221). The same wide variation in individual catches has been noted from Sri Lanka (18) to Brazil (64) and Norway (96).

Many factors, it is widely recognized, influence success. Biologists tend to account for such differences in success in terms of fishing effort, usually measured in terms of days or hours spent fishing (70), and a few anthropologists have also made this argument. Kottak (114), for example, has argued that fishing success is correlated with traits that are suggestive of the "Protestant ethic." Others have noted that success is related to other personal or psychological characteristics. Forman (83, p. 19) mentions that "youth, good health, sobriety, willingness to take calculated risks, and the ability to command allegiance of a crew . . ." are necessary for success. Roberts & Acheson (202) show that the success of Maine groundfishing boats is strongly correlated with the psychological match between captain and mate affecting choices of fishing strategy. However, the vast majority of anthropologists are convinced that such differential success is primarily due to marked differences in fishing skill (5, 24, 27, 64, 82). There is some quantitative evidence from one fishery that they are correct. In the Maine lobster industry, a very large number of technical, environmental, and personal characteristics influence catches. A regression analysis of 21 of these factors showed that skills were very near the top of the list. Only two variables had more influence on catch than skill (i.e. season and length of trap), while some 19 variables had less influence (11).

While it is clear that skills are important, it is very difficult to obtain information on the nature of those skills because, as Andersen (24, p. 306) points out, fishermen "treat this often hardgained information as scarce capital." The reluctance of fishermen to share information about skills has been very widely noted (5, 25, 75, 77, 83, 147, 163).

Despite the difficulties of studying fishing skills, there is a growing body of literature on the subject which demonstrates that in many fishing societies the kinds of skills necessary for success are very much the same. Obviously, a fisherman must know how to operate and maintain his boat and equipment. Anthropologists have not concentrated on these skills, perhaps because they seem so obvious. They are not at all obvious to novice fishermen (5), and I suspect most anthropologists are unfamiliar with them as well. However, anthropologists have focused attention on the kinds of skills that occupy so much time and attention of experienced fishermen—namely ways to find concentrations of fish to be caught. These skills are of four different kinds.

First, the key to being able to locate concentrations of fish is to know where those concentrations are apt to be and to be able to find those spots.

This means one must be able to navigate with great accuracy. Before the advent of complicated electronic gear such as Loran, navigation was often a difficult art to learn. In some cultures, kinds of dead reckoning systems were used which depend on detailed knowledge of stars and characteristics of sea and sky. The best description of such a system has been done by T. Gladwin (95). In the vast majority of fishing cultures, however, fishermen not only navigate by means of dead reckoning, but also locate positions by a detailed knowledge of the bottom over which they are traveling (5, 82, 113). Second, fishermen have a good knowledge of the ocean itself—its depth, currents, reefs, types of bottom. This knowledge is essential, especially if one wants to avoid damaging or losing fishing gear (5, 248). Third, fishermen have a detailed knowledge of the species of fish they are seeking—their habits, breeding cycles, enemies, food supply, feeding habits, and especially migration patterns and habitats. Particularly good accounts of this aspect of fishing knowledge are provided by Morrill (143) and Cordell (64). While fishermen typically know a great deal about the behavior of the animals they seek, they do not appear to have a very elaborate taxonomy of fish (143). However, little has been done to elicit the cognitive maps of fishermen. One exception is provided by Pollnac (182), who uses canonical analysis to analyze the types and characteristics of fish salient to fishermen in Costa Rica. Fourth, fishermen have to know what other fishermen know and how they will behave. Catches, after all, depend not only on locating fish, but also on how many other fishermen are after them. This kind of knowledge is closely related to the issue of information management and rules limiting competition. The way one uses the competition and maneuvers around such boats differs substantially from fishery to fishery (see 26, 66, 159).

**FISHERY SWITCHING** Perhaps the most common strategy used by fishermen to adapt to uncertainty is to combine occupations. Leap (118) points out that in tribal and peasant societies, fishing is rarely done exclusively. It is almost always combined with hunting, agriculture, or other occupations. Löfgren (123) reports that Swedish peasants often combined fishing and farming to such an extent that it was difficult to tell which was their major occupation. In modern fishing societies, it is very common for fishermen either to hold multiple jobs, in which fishing is alternated with nonfishing jobs, or to switch between different fisheries over the course of the annual round (8, 129).

However, in many societies with a mixed economy, the cultural and emotional significance of fishing far overshadows that of agriculture. In this regard, Fox writes, "But somehow [the land] does not have the same

emotional quality as do the boats. No one ever died digging potatoes; there is no danger planting barley" (83a).

The conditions under which fishermen switch jobs or combine fisheries are not well understood. Davenport (72) uses a game theory approach to analyze factors influencing Jamaican fishermen to switch between lagoon fishing and offshore fishing. His use of game theory has been seriously criticized, however (201).

The work of Middleton (138) and Pi-Sunyer (171) suggests the obvious but important conclusion that fishermen combine fishing with nonfishing work in times of economic distress. The changing of fisheries over the annual round, while a widely noted phenomenon, is even more poorly understood. One study in Maine, however, indicates that changing fisheries over the annual round is connected to the career cycle of fishermen and to the desire to make a permanent change from one major fishery to another (8).

**CAPITAL MANAGEMENT** Fishing success in the long run is linked not only to ability to catch fish, but to the ability to handle and invest the money generated. While there have been few studies of financial management decisions among fishermen, these studies have produced some interesting results.

One argument in the literature concerns the viability of family-owned firms. Wadel and Löfgren (122, 242) argue very persuasively that family-owned firms in Scandinavia have certain advantages and are especially adapted to absorb the shocks of fluctuating resources, competition for crews, and problems of amassing capital. In other areas, family-owned firms have proved to be very vulnerable—especially when investment requirements and returns to capital increase (243). Under these conditions nonfishermen begin to invest heavily in the industry, fishermen gradually lose control, and ultimately fishermen become a kind of sea-going proletariat (155). These differences in the viability of firms cannot be explained solely in terms of levels of capitalization required. In Maine and Norway, where family firms have proven very resilient, fisheries are modernizing and capital requirements are rising rapidly. Yet in other areas such as Grenada (76) and Newfoundland (33, 155), modernization and increased investment have led to outside ownership of fishing firms even though the amount of capital required was relatively small. Clearly, additional data are needed on the factors affecting the financial viability of fishing firms—especially management strategies.

Two different types of studies have provided conceptual tools which might be useful in this effort. First, McCay and Moyer demonstrate that the repertoire of capital management strategies in two fishing societies was not constant, but changed as the external environment changed (130, 144). In

Newfoundland, fishermen responded to declining resources by using two such adaptive strategies which McCay terms "intensification" and "diversification" (130). Moyer (144) describes the way the introduction of wage labor into an Eskimo community altered standard practices for maintaining capital in boats and equipment. Second, Heaney (100) delineates the network ties one fisherman activated to begin a fishing business and the strategies and ties he used to expand it.

Understanding the range of strategies open and the kinds of ties necessary to actualize each would go a long way toward increasing our understanding of the economic opportunities available to fishermen and the factors influencing the viability of their fishing operations.

**INNOVATION AND TECHNICAL CHANGE** One of the primary ways fishermen compete with others is by adopting new and more effective fishing gear and vessels. Despite this fact, fishermen the world over are surprisingly conservative and there are, if anything, more documented cases where innovations have been rejected than accepted. Anthropologists examining the innovation process in fishing communities have used four very different theoretical perspectives in studying fishing innovations.

First, it is axiomatic in anthropological studies of innovation that innovations are likely to be rejected if they are unprofitable economically or if they are incompatible with existing cultural patterns (120). Here, emphasis is on the social and cultural factors affecting innovators as a class—not on the decisions of individual innovators. Sabella (205), for example, reports that fishermen in one Peruvian port did not adopt motors because they were being introduced via a new cooperative whose administration was inept and which had an ideology very much at odds with that of local fishermen. Baluch fishermen rejected motors because they threatened the traditional way of life (165). Forman (83) notes that in Coqueiral, Brazil, sailboats with hulls were adopted by the local elite but not by the vast majority of ordinary fishermen who could not raise the necessary capital.

In the past several decades, on the west coast of Sweden and in the Faröes, fisheries have expanded and modernized, and large offshore fishing vessels have been adopted. In both cases, the adoption of this new technology came about as fishermen responded to new opportunities created as banks and government agencies made large-scale loans available and as markets were reorganized so that it was possible to export large quantities of fish profitably (107, 123).

Second, in the past 30 years, research on innovation has focused on decisions by individuals to adopt or reject innovations. These studies have tried to answer two questions: (1) who adopts innovations and why do they do so? and (2) which innovations are adopted? In this body of literature, it is axiomatic that the adoption of innovations is highly differential, with

some people ("early adopters") adopting innovations before others (who are termed "middle and late adopters") (203). Moreover, innovations with certain traits are adopted consistently ahead of others with other traits.

There are few studies of this kind in the literature on fishing societies (145). Several authors have noted by way of passing that innovations tend to be accepted by one or another category of fishermen, but there is no analysis of the adopting individuals or the traits of the innovations adopted. In several studies it has been stated that age and career cycle are critical in the adoption of fishing innovations. Middleton (138) notes that young men in an Ecuadorian fishing community were far more prone to enter tuna fishing than older, more cautious men; and Wadel (242) argues that fishermen in Newfoundland adopt innovations and build up their capital at certain stages of their careers. One of the best studies of this type has been done by Goodlad (96), who points out that efficient purse seines in the Shetland Islands were rejected primarily because the owners of the vessels were older men who did not want to invest heavily in new gear and boats since they would not gain all the benefits, and because the adoption of such nets would threaten the traditional systems of authority. They also worried that increasing catches might threaten the fish stocks and possibly glut the market.

Another outstanding case study is provided by Ward (243), who analyzes the reasons Hong Kong fishermen adopted motorized vessels and the consequences. Ward points out that many prerequisite conditions for rapid development existed among Hong Kong fishermen (i.e. wage labor, absence of clans, links to world markets) so that when new opportunities came along in the form of motors, some were able to respond quickly. Mechanization, however, is resulting in a "clear three-class stratification" system in which one group of independent owners is doing well and two other sets of fishermen are being driven out of business (243, pp. 285-87).

At present this whole approach to the study of innovation is in the process of radical change (200). There is increasing evidence that innovations are adopted when they are matched to the needs of adopters. One fishing study supports this new approach. In the Maine fin-fishery (i.e. groundfish and herring) there are no "early adopters" (i.e. people who consistently adopted innovations earlier than others) and no innovations that were easier to adopt than others. In this fishery, a regression analysis demonstrated that innovations were adopted when they fitted the needs of particular adopters. In fact, the adoption of no two innovations could be explained with the same exact set of factors (14).

Third, the fixed nature of the resource base operates to inhibit the adoption of innovations. Technological innovation will increase the output of fish only when there are more fish to catch. If the biological maximum has already been reached, then the adoption of more efficient boats and fishing

gear will not mean an increase in output but rather that the same amount of fish can be caught in less time. This can lead to unemployment of capital and labor and inefficiency (245). Ultimately, it can lead to overfishing and stock failure (194). Under these conditions, fishermen and politicians have sometimes opted to adopt the innovations and then enacted conservation rules which prevented their being used efficiently (89, 219). In other instances, fishermen have rejected the innovations primarily to prevent the unemployment or declines in stock it might bring (55, 96, 177, 229).

Fourth, a large number of anthropologists are interested not so much in the factors influencing the adoption of innovations as in the impact of innovations on the social system once they are adopted (86). [Several articles of this type are contained in *Those Who Live by the Sea* (226).] In several cases, studies have indicated that the introduction of innovations and modernization of fishing fleets led to inequality and a loss of control by fishermen (16, 17, 43, 135, 171). In other areas, the adoption of motors lowered the income of fishermen (238). Several studies indicate that technical change led to multifaceted changes in social structure and organization. Epple (76) shows that adoption of motors in the Grenada fishing fleet ultimately led to: fishing for new species, new gear, new fishing locations, migration to the city, concentration of capital, increased status specialization, and ultimately to the formation of a cooperative. Christensen (59) argues that among the Fanti the new motors changed the shares system, the relationship between husbands and wives, and also increased the power of the market women who loan money for capital equipment.

Other studies stress that technical change brings unemployment, ecological damage, or both. In Japan and New England, the adoption of more efficient fishing boats and gear caused overexploitation of stocks as well as a decline in the number of fishermen employed (37, 90). In Scotland, increased investment in new lobster fishing boats and gear resulted in a serious threat to the stocks (193, 194).

Most anthropologists have been interested in the social changes stemming from changes in technology; a few, however, have analyzed the way changes in social structure have affected choice of technology (211).

## COMMITMENT TO FISHING AND PSYCHOLOGICAL CHARACTERISTICS OF FISHERMEN

### *Commitment to Fishing*

Despite the risks and uncertainty associated with fishing, the preponderance of evidence suggests that in most fishing societies, fishermen are usually committed to their occupation. Quantitative studies of attitudes in Panama revealed that fishermen "generally have a positive attitude" toward their

occupation (188); and another similar project in Rhode Island turned up the fact that fishermen were more committed to their occupation than millworkers (177). The reasons that men gave for liking their work in these two different cultures are surprisingly similar. In southern New England, fishermen said they liked fishing because of the: "independence," "challenge," "working outdoors," "lack of regimentation," and "income" (177, p. 54). In Panama, fishing was attractive because it was "pleasurable" ("gaming aspect of fishing"), gave a good income, and allowed one to be "independent" (188, p. 16).

However, while the level of commitment is generally high, there is evidence that the reasons fishermen like or dislike fishing can vary sharply even within a relatively small area. This is best demonstrated by Pollnac & Poggie (187), who have used Maslow's hierarchy of needs concept to study job satisfaction among New England fishermen in three ports.

### *Psychological Adaptation*

Several anthropologists have argued that fishermen are psychologically adapted to the conditions they face. While there are few studies in this area, two important points have been made. First, if people are going to succeed in this occupation, they must be able to plan ahead and defer rewards. The income from fishing is rarely steady, and yet boats and fishing gear need maintenance and replacement. Studies by social scientists at the University of Rhode Island point out that in southern New England, Puerto Rico, and Panama fishermen defer rewards to a greater degree than do men working on land (172, 184, 185, 188). Other closely related studies show that deferred gratification is a predictor of success among fishermen (173).

However, one study demonstrates that fishermen may not be psychologically adapted to certain aspects of their jobs. A study by Pollnac (181) carried out in Costa Rica points out that the more experience men had in fishing, the more susceptible they were to certain illusions. This might make it difficult for them to "accurately interpret data from electronic equipment" (181, p. 432).

### *Personality Traits*

The psychological characteristics of fishermen show remarkable similarities cross-culturally. There is substantial evidence that fishermen in many societies are aggressive, courageous, and independent. This is perhaps to be expected in a dangerous occupation where decisions must be made by one's self and quickly. Raft fishermen in Brazil have become legendary heroes, and tales of their exploits are told widely (83). Much the same is true in Greece (40). Abrahams (1) tells us that fishing captains on Tobago must be brave men to encourage their crews. They are also apt to be more aggressive than

nonfishermen (34). Several other studies support the idea that fishermen in places from Panama to Puluwat and Ifaluk enjoy the challenge and the risks of their occupation (54, 95, 177). In addition, a very large number of studies in widely separated cultures have mentioned the independent nature of fishermen (34, 84, 177, 188, 206).

Fishermen must depend on each other both to produce fish and to reduce risks. One might assume that they would also be able to work with others. There is some support for this hypothesis in the literature. Both McGoodwin (134) and Aronoff (34) stress the cooperative nature of fishermen in the communities they studied in Mexico and St. Kitts.

Several authors have noted the extreme masculine display often made by fishermen, which some have termed a "macho complex" (159). The explanations of this behavior would not be considered flattering by most fishermen. Tiller (239) notes that fishermen are often the sons of fishermen and thus are raised in households where men are absent much of the time. This situation, he hypothesizes, leads to identity problems and the development of feminine traits. He suggests that the "macho" behavior of fishermen is a compensatory complex, a disguise. Andersen & Wadel (28), who, the rumor mill suggests, have only narrowly avoided lynching on a Newfoundland dock, have noted that fishermen spend a long time away from home in the company of other men. They suggest that women really control fishing households and that long periods at sea conjure up threats of "homosexual behavior." The supermasculine display, they say, "provides in fantasy what is not provided in fact" (28, pp. 144-45). Specifically, it provides men with the "illusion" of being in control over their families and helps to ward off the danger of homosexual activity.

Several anthropologists have commented on the fact that a good deal of social distance exists between fishermen and others in the same society. Caribbean and Portuguese fishermen feel they are superior to agriculturalists (111, 196). In Japan and India, the opposite is the case. Norr & Norr (154) suggest that in these hierarchically organized societies, the separation of fishermen by caste barriers functions to insulate the society as a whole against the threatening values and behavior of fishermen (i.e. independence, aggression).

### WOMEN AND FAMILY LIFE

In most fishing societies in the world, there is a strong sexual division of labor: the men fish while the women mind the household (180). Certainly this is the case in most of the fisheries in the industrialized West. It has been suggested that fishing requires stamina and strength, and women presumably do not have these qualities. A variant explanation is that boats are

small and cramped, and there is no room for someone who cannot do their share of the work. However, such explanations give a somewhat simplistic view of the division of labor in fishing societies, because there are a large number of cases where women do participate in fishing. Hornell refers to several examples from around the world in which women are involved in all kinds of fishing operations—some of which are very demanding and dangerous (104). In those Southeast Asian societies where women live on boats, women are, of course, present during all fishing operations (151). There are also women on Russian factory ships and Swedish girls who help pull nets in the Baltic fisheries (123). As Andersen & Wadel (28, p. 142) point out, the relative mix of men and women in different work situations must always be explained "in cultural terms and fishing activities are no exception." However, the conditions under which different mixes of men and women are included in fishing activities has not been delineated.

In our society and in many other societies where fishing is industrialized, there is a sharp division of labor. In these societies, fishermen and their wives and families are separated a good deal of the time and live in separate worlds. This means that the entire family must be able to operate without an adult male much of the time. Wives of fishermen and their families appear to be able to cope as well if not better than wives of military officers or other single household heads (71). The studies of fishing families support the idea that fishermen's wives are unusually independent, resourceful, and generally well able to cope with operating the household single-handedly (71, 240). There is little evidence of unusual pathology. Moreover, in the literature there is no solid evidence that the absence of an adult male is harmful to children—although such harm may in fact be done. This is not to indicate that having a husband absent and working in an unusually dangerous occupation does not cause problems and strain. Orbach (159), Tunstall (240), and Faris (77) give some insight into the difficulties such families face in different parts of the English-speaking world. A study done by Danowski (71), which focused exclusively on the attitudes of fishermen's wives in Rhode Island, turned up some interesting results. Danowski demonstrates that fishermen's wives are generally satisfied with their life and husband's occupation, primarily because their husbands like it and because it gives a relatively high income. They are not as disturbed by the danger of the occupation and the threat of instant widowhood as they are by the fact that they cannot plan a schedule in advance, and the fact that fishing takes precedence over important family activities (for example, graduation, birthdays).

Two adaptations deserve mention. In deep sea fisheries especially, husbands and wives are apart more than they are together. Both husbands and wives build up separate sets of ties, loyalties, and activities that do not

include the other. For the man, his ship is his real home and the ties with his shipmates are as close as those with his family (28). The wife establishes ties with other women, kinsmen, and so on. When the husband returns home, both husband and wife have to reorient themselves to each other and drop the ties they have both established when the husband was away fishing. The time the husband is home often seems like a holiday (71). But because such husbands and wives are really adapted to living apart, a good deal of strain can develop if the husband stays home too long. This strain is exacerbated by the fact that while husbands are supposed to have authority ashore, real decisions about the family are made by the wife (28). Danowski (71) reports that when the husband is ashore, the wife has to work harder, normal schedules are disrupted, and life is more hectic. When he leaves, things return to normal. The fisherman, for his part, is often glad he is back at sea again (240).

In some fishing societies, wives of skippers also take a very active role in the family fishing business. They regularly do the accounting, bargain with fish dealers, and order parts and gear while their husbands are at sea (71). In at least two reported instances, wives of fishermen organized politically to lobby for the family business (13). While men are at sea they are, of course, unable to attend meetings, take phone calls, do correspondence, and do the myriad of small details any business demands. Their wives also appear more attuned to all aspects of social life ashore.

## INTRACULTURAL DIVERSITY

So far we have stressed many of the common themes that are found threaded through the literature of fishing. However, we need to stress that there are substantial differences between fisheries—even fisheries in the same culture. M. E. Smith (224) has pointed out that seamen on Great Lakes boats are from a different occupational subculture than those on vessels in ports on the Atlantic. But important differences can be seen in much smaller areas, such as ports in the Northeastern part of the United States. Gloucester and New Bedford have large ethnic populations and are devoted to offshore fishing. Newburyport, Provincetown, and Chatham, Massachusetts, and Stonington, Connecticut, are all small ports generally involved in inshore fisheries, but there are notable differences in the composition of the fleets of these ports, the lifestyle of their inhabitants, the species fished for, and economic success of the fishermen (46, 108, 139, 167, 178). Strong differences can also be seen between the industrialized, urbanized, booming ports of southern Maine, where groundfish are the major species sought, and the herring and lobstering harbors of eastern Maine which are

in one of the most rural, depressed locations in the U.S. (12). Almost certainly marked differences can be found between nearby fishing ports in other ethnographic areas.

## THE ACTIONS OF GOVERNMENT: FISHERIES MANAGEMENT AND DEVELOPMENT

### *Theoretical Perspective*

Although fisheries management involves regulating human behavior, social scientists have not been involved in fisheries management until very recently (206, 231). The field has been dominated completely by biologists and economists, and this is reflected in the basic conceptual tools used. The basic concepts used in fisheries management are economic models based on "Schaeffer curves" and the theory of common property resources. The two are closely connected. Schaeffer curves essentially see recruitment into the fishery (i.e. numbers of marketable-sized fish which become available) as a function of human predation called "fishing effort." As can be seen in Figure 1, actual fishing effort in fisheries selected for management is so high that breeding stock has been damaged, and thus recruitment is less than it would be at a lower level of effort. The object of fisheries management is to lower fishing effort. Biologists tend to think of reducing effort to obtain maximum sustainable yield (MSY) (213), while economists argue that effort should be limited to produce maximum economic yield (69).

The relationship between productive effort and output in fisheries is rare in the annals of economics. In fishing, one receives more production with less effort than with higher effort after MSY has been exceeded. This "backward bending supply curve" for fish causes some strange economic anomalies.

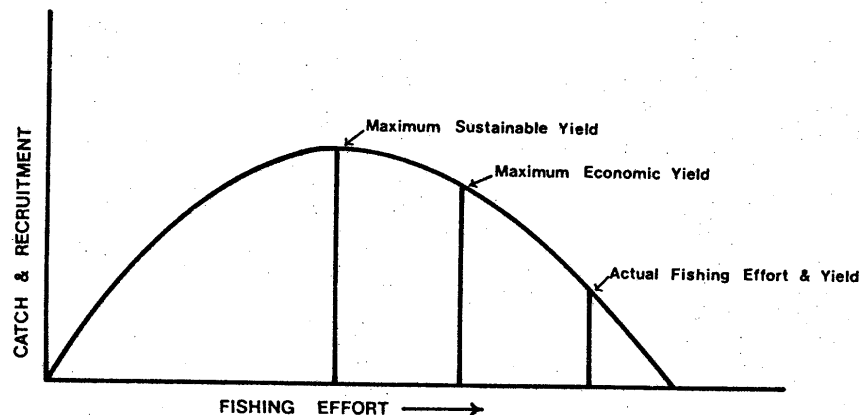


Figure 1 Relationship between fishing effort and yield.

lies. For our purposes, it is important to note that according to these bioeconomic models, all parties would gain by fisheries management. If effort were reduced, fish stocks would revive, fishermen would get larger catches with less effort, so that both efficiency and returns would increase, and the consumer would get more fish at a lower price.

Why do fishermen overexploit? The usual answer is that fish are a common property resource and thus are protected by no one. Why should a fisherman conserve? "The fish he does not catch this morning will only be caught by someone else tomorrow. Under these conditions, a fisherman is only being rational when he expands the amount of capital equipment he owns and tries to catch as many fish as quickly as possible" (9, p. 20).

The result is what Hardin (99, p. 1244) terms "the tragedy of the commons." The "tragedy" has both ecological and human dimensions since people are locked into a system in which they are destroying the resources on which their livelihood depends. In the fisheries, the result is overexploitation, damage to the breeding stock, lowered catches, higher prices for consumers, inefficient use of capital resources, and, where opportunity costs are low, the acceptance of low incomes (30, 60, 61, 67, 68, 97, 190, 191, 210). Fishermen, according to this view, cannot and will not limit their own exploitative efforts in the interest of conservation. Regulation by government is necessary.

Anthropologists are able to modify and extend this body of concepts in several different directions. First, in many societies, oceans are scarcely common property resources. As we have seen, in a large number of societies in the world, fishermen do maintain ownership rights over ocean areas (75, 109, 153) including some in the modern United States (2, 7, 132). In many other fisheries, as Andersen (24) stresses, fishermen use a variety of strategies to gain "privileged access rights" to fishing territories which "range from the most public to the most private."

If the theory of common property resources is valid, establishing property rights over fishing areas should produce favorable effects. Specifically, we would expect that where property rights exist, there would be less likelihood of overexploitation of resources, larger catches, more efficient use of capital, and higher wages to fishermen. One of the difficulties in testing this hypothesis is that it is very difficult to measure changes in the yield of fisheries and carrying capacities of the ocean (65), to say nothing of obtaining accurate income data. In the anthropological literature, there is evidence supporting this hypothesis (38, 132). McCay (132, p. 35) for example, argues that the fishermen's cooperative in a New Jersey port effectively limits access to the fishery which "reduces overfishing." There is also qualitative evidence. Acheson demonstrates that where Maine lobstermen vigorously defend their fishing areas, catches and catch per unit of effort are higher and the

incomes of fishermen are significantly larger (3). In addition, the chances of a female lobster surviving to the size where she can extrude eggs is estimated to be 50 percent higher in perimeter-defended areas than in nucleated areas (246).

Forman (82, p. 417) argues that secrecy about prime fishing locations "minimizes competition and prevents overfishing by according temporary property rights to individual fishermen." However, Cordell (63) and McCay (130) believe there is no evidence in the societies they have studied that secrecy alone either reduces fishing pressure or helps to maintain the resource in the long run.

Behind the idea of a tragedy of the commons lie certain assumptions about the motivations and social organization of fishermen. Specifically it assumes fishermen are motivated to catch as many fish as fast as possible for monetary reasons alone, and that they operate completely independently in a situation Crutchfield & Pontecorvo (69) call "competitive withdrawal." This certainly may describe the situation in certain fisheries. It is a highly inaccurate summation of others. Fishermen interact with each other a great deal, and depend on each other for information about the location of concentrations of fish and for the assessment of effective innovations (159, 248). They are certainly capable of forming a variety of institutions. In addition, the motivations of fishermen are very complicated. C. L. Smith (222) points out that fishermen gain a great many things from fishing besides income; and the work of Pollnac, Gersuny & Poggie (184) not only echoes this theme but suggests that income may be relatively unimportant in the selection of occupation and commitment to it (177, 186, 187).

### *Fisheries Management in Practice*

The theory of common property resources and the closely associated bio-economic models would lead one to think that since everyone—including fishermen—will gain from conservation and management, efforts to conserve fish resources should receive a good deal of political support from those in the industry. In most cases the exact opposite occurs. In fact, Crutchfield & Pontecorvo (69, p. 6) speak of the "vicious and continuous political infighting that has plagued conservation authorities."

This lack of support stems from the fact that fisheries management often has deleterious effects on people in the industry that have not been taken into account by either the economists or the biologists who have been responsible for developing management plans. The problem, as C. L. Smith points out (217, p. 33) is that "any set of rules helps some and not others." Exactly who is helped and hindered depends on the specific rules and the nature of the fishery.

For example, regulation of fisheries by limited entry is recommended by several economists since it promises to reduce effort while maintaining

economic efficiency (60, 191). Such regulations would create a good many different kinds of problems (166). The salmon industry of British Columbia and Alaska is currently being regulated by limiting the number of licenses. Smith and Langdon (115, 217) have pointed out that these limited entry rules have resulted in extreme inequality, with some fishermen having very high incomes and others removed from the fishery entirely. In Alaska, the law has worked against the interests of native Americans (116). In Maine a law is currently being seriously considered to raise the legal size measure for lobsters to allow a larger proportion of females to survive into the size range where they are capable of extruding eggs. Acheson & Reidman (15) have demonstrated that such a rule would increase the net revenues to fishermen in the long run, but would severely decrease fishermen's income during the proposed 5-year period when the measure would be increased. The proposed legislation is not popular with the majority of established fishermen. In a similar vein, Antler & Faris (33) argue that a variety of government regulations, enforced by several different agencies in Newfoundland, unintentionally aid owners of large, modern offshore vessels and penalize the inshore fleet.

Since regulations benefit different groups, it is scarcely surprising that support for many fisheries management bills is mixed. One study on the fin-fishery of northern New England found that people opposed or favored "limited entry" legislation depending on the way such legislation would affect them personally (9). Another study of the Maine lobster industry demonstrated, not surprisingly, that fishermen generally favored management legislation that was congruent with existing norms and social institutions (4).

The consensus of opinion among anthropologists is that current efforts to manage fisheries have not succeeded very well. They differ somewhat in their prognoses for the future. Andersen (22) points out that regardless of what background fisheries enforcement officers come from, they are bound to conflict with fishermen for one reason or another. C. L. Smith, who has watched the steady decline of the salmon fisheries of the northwest coast, believes that efforts to manage fisheries are doomed to failure (215, 216). He points out (218, 221) that rules designed to manage salmon fisheries have not only created conflict, but have also been ineffective since fishermen have proved very adept at innovating their way around them. Smith believes that getting food "from the sea by hunting and gathering does not pose a viable long-term alternative," and that only large scale "domesticated mariculture" can increase the amount of protein harvested from the oceans (219). Other anthropologists have been impressed by the ability of fishermen to form various kinds of institutions to limit access to marine resources. They tend to be more optimistic about the prospects of management since such institutions have the seeds of management regimes in them. Management

of fish resources, they believe, would succeed best if laws were enacted which took advantage or reinforced such informal arrangements (4, 24, 132). Certainly such plans would receive more local political support (231).

With the exception of economists, social scientists have played a very small role in the formulation of fisheries management plans (4, 6, 22, 23). That situation has changed, in the United States at least, since the passage of PL 94-265, the Fisheries Conservation and Management Act of 1976, which extends U.S. jurisdiction over fisheries out to 200 miles. Under this law, the coastal areas of the U.S. are divided into eight regions. In each region, fisheries management plans are formulated by a regional council. This act calls for the management of U.S. fisheries for optimum sustainable yield (OSY), which means, in essence, that fisheries shall be managed not only for biological ends but for social and economic ends as well (241).

There is one serious difficulty: there is no agreed-on way to operationalize OSY, and no agreement on what social, biological and economic data are needed or how they should be integrated. The problems inherent in the concept have only been revealed in their full complexity since the law was passed (160).

The Regional Councils have reacted to the absence of information on OSY, in the main, by the simple expedient of ignoring it. They have framed fisheries management plans to come as close to achieving MSY as was possible given the political pressures involved. Both fishermen and biologists have been unhappy with the results (248). The way one fisheries management council (i.e. New England) has operated in its formative phase has been described by M. E. Smith (225). Three studies have been completed on the effect of the New England council's decisions on the fishing communities of the region. Husing (105) describes the way the fishermen of Provincetown organized themselves to oppose the bureaucracy effectively. Another study (10) points out that the quota system used by the council stimulated investments in larger, better equipped, and more versatile boats so that total fishing effort was increased rather than decreased. In Gloucester, Miller & Van Maanen (140) show how federal attempts to manage the fisheries resulted in serious conflict between two groups of fishermen of Italian extraction due to the unwillingness of the government to administer the law and the different value placed on obedience to the law by members of these two groups.

Despite the problems, there can be no question that PL 94-265 has opened many doors to anthropologists interested in applied fisheries work in the United States. At least four anthropologists are permanent members of committees that advise different regional councils. Others have provided background data for management plans for specific fisheries, which have been submitted to regional councils (148, 162). Smith and Thygesen con-

tributed to a study of the salmon industry in the Pacific Northwest (162). Acheson, Poggie, and Pollnac did a general sociocultural profile for the New England Groundfish Plan of 1980 (148). Other anthropologists have completed other types of applied studies. Peterson & Smith (169) reported on fish marketing in New England for the National Marine Fisheries Services, while Paredes, Sabella & Hepburn (164) prepared a monograph on the social structure and attitudes of the people in one small Florida community which is designed to be of use to those concerned with both development and conservation of marine resources. A study of Maiolo et al (125) and another by Groth (98) should be similarly useful. While such works contain few ideas new to anthropologists, they do provide general sociocultural data on specific fisheries and information on the meaning or value of fishing to the people of those communities. The presentation of such data has not been part of the fisheries management process before.

Still other anthropologists have become involved in areas requiring detailed knowledge of the social, biological, and economic aspects of specific fisheries. Peterson & Friedman (168) wrote a plan to manage the Massachusetts lobster fishery, for example. Others have assessed the impact of such plans (15, 116). At least one anthropologist has shown how social science might be of use in stock assessment (189). While additional work of this kind is to be expected, it should be noted that when anthropologists are involved in such endeavors they have temporarily left traditional anthropology and have entered a strange interdisciplinary world where knowledge of coastal cultures is of little use in the absence of data on the behavior of fish, the economics of the industry, and the give and take of local politics.

### *Fisheries Development*

Fisheries development is the obverse of fisheries management. Management seeks to increase output and conserve overexploited stocks by lowering fishing effort (See Figure 1). In development, governments or private bodies are attempting to increase the supply of fish by increasing fishing effort and productive capacity through the diffusion of innovations, marketing, schemes, etc. Anthropologists have, on the whole, done little work in fisheries development. The reason is that overexploitation of stocks is generally a far greater problem than underexploitation. Many of the stocks in temperate zones, which have long been exploited by industrialized fleets, are in serious difficulty (20). Governments of Third World countries want to develop their fisheries (121, 135), but these tropical stocks are very fragile (D. Stevenson, personal communication). Many are overexploited, even though the technology of fishermen is relatively unsophisticated. In the Philippines, for example, the 600,000 artisanal fishermen have overexploited stocks in virtually all areas of the country's inshore waters (C.



Bailey, personal communication). In these cases, attempts to develop fishing fleets by promoting investment in more efficient boats and gear has resulted in unemployment (16, 17, 135). As Lockwood & Ruddle (121, p. 12) bluntly state, "These efforts [at development], however, have not for the most part improved significantly the levels of living of artisanal fishing households and have often worsened their position." In cases where the MSY of fisheries has been attained or exceeded, innovation or fisheries development must either be accompanied by management (193) or by programs to retrain and help unemployed fishermen (190).

\* In Third World countries of East Asia, aquaculture holds forth some promise as a means to increase the supply of protein and to increase the employment of fishermen (37). However, those few anthropologists who have studied the diffusion of aquaculture in Third World countries are not sanguine about the possibilities. Two problems have been mentioned. Yengoyan (249) points out in one area of the Philippines that the capital and skill requirements of aquaculture are so high that few of the "rural proletariat" have been able to establish viable aquaculture operations. Aquaculture is largely for the middle class. McGoodwin (136) believes that it would be difficult to diffuse aquaculture to rural communities in Mexico due to a variety of political, economic, and social blocks.

In the industrialized world, attempts by governments to modernize fisheries and fishing communities have met with mixed success. Such attempts have succeeded nicely in Sweden (123) and spectacularly well in the Farøes (107), where government loans and incentives have resulted in one of the most modern and perhaps the most productive fleet in the world.

Such efforts have not worked well in other parts of the world—particularly in Newfoundland where a number of excellent studies have been done on the effect of governmental efforts to modernize the fisheries. Antler & Faris (33) argue that a number of government agencies in Newfoundland had policies which inadvertently favored the large offshore fleet, owned by entrepreneurs in urban areas, and made it very difficult for the inshore fleet to survive. In the process, it "proletarianized" a large number of men who had been independent fishermen and greatly reduced the economic contribution of women (32, 33). Britan (51) and McCay (131) echo these conclusions, and point out the difficulties small fishermen have maintaining a crew and a viable fishing enterprise.

Prattis (195) argues that the effort of governments to develop fishing communities in the North Atlantic are bound to fail, because the basic strategy used is flawed. He states that all of the fishing communities from England to New England are marginal communities whose poverty is caused by the fact that they are on the edge of developed urban areas which

have denuded the surrounding hinterlands of capital and other assets. Governments are trying to aid such communities by tying them into urban markets. Such policies, he states (195, p. 20), "misunderstand that the existing marginality itself is a result of exposure to the particular structure of modern market forces." If this argument is sound, its implications extend far beyond studies of fishing.

## SUMMARY AND CONCLUSIONS

Maritime anthropology is perhaps unique in that it is one of the few fields whose worth has been questioned by its own practitioners. Those studying fishing societies have, I believe, made an important contribution by documenting the ways man has adapted to earn a living from a highly alien and dangerous environment. Fishermen the world over have sought to reduce uncertainty and spread risks through the use of a set of norms, institutions, and networks of various types. If one cannot control the weather and fish, one can use social ties to organize an effective crew, obtain information on concentrations of fish and have privileged access to them, and be assured of a secure market for the catch.

The common property nature of marine resources makes fishing a competitive endeavor. Fishermen in many societies use very similar strategies to compete effectively, including: acquisition of skills, information management, capital management, technical innovation, combining occupations, and use of efficacious rituals. Despite the risks of fishing, fishermen are committed to the industry, and they and their families appear adapted to the uncertainty and periodic separations characteristic of this way of life.

Many maritime anthropologists have been involved in applied aspects of fisheries management in modern industrial countries. Their most important contributions lie in their modification of some of the assumptions underlying the theory of common property resources and in their analysis of fishermen's frequent opposition to fisheries management schemes.

Despite the burgeoning literature on fishing societies, few issues are closed and many critical questions remain. To me, four questions are of importance at present. What are the relationships between men on fishing vessels, and how does prolonged absence of males affect the socialization of children and family structure? How are social, economic, and biological data to be integrated to achieve OSY? What is the role of kinship in fishing societies? The flexibility of kinship ties has been noted repeatedly, but there have been very few studies of the wide variety of kinship systems found in fishing societies worldwide. Finally, can the many kinds of norms and institutions fishermen had invented to control access and fishing procedures

be used as a basis for successful resource management? The last may be the most critical for maritime anthropology. Unless the widespread overexploitation of marine resources can be halted, there may soon be few fishing societies left to study.

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## ANTHROPOLOGY AND INDUSTRY: REAPPRAISAL AND NEW DIRECTIONS<sup>1</sup>

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*Carol S. Holzberg*<sup>2</sup>

Department of Anthropology, Erindale College, University of Toronto,  
Mississauga, Ontario L5L 1C6, Canada

*Maureen J. Giovannini*

Department of Anthropology, Boston University, Boston, Massachusetts 02215

Many social scientists believe that an understanding of industry is crucial to an understanding of present day society. What is industry? What way of life does it provide; what patterns of behavior does it foster; and what effects does it have on an individual's other relationships in the society? Until we can answer this kind of question we can not have an adequate understanding of our modern industrial cities which hold so many lives within their bounds.

Burleigh B. Gardner, *Human Relations in Industry* (86, p. iii).

### INTRODUCTION

The following article is a critical reappraisal of the last 50 years of anthropology and industry intended to review and assess the major writings of industrial anthropologists. The paper also describes the early research

<sup>1</sup>Although portions of this paper were originally presented at the 1977 meetings of the American Anthropological Association (Houston, Texas) in a session entitled *Anthropology and Industry: Reappraisals and New Directions*, organized by C. S. Holzberg, the present article represents a joint effort on the part of the two coauthors. Order of authorship was decided by a flip of a coin.

<sup>2</sup>Present address: School of Education, Hills South, University of Massachusetts, Amherst, Massachusetts 01003.