

Rethinking Artisanal Fisheries Development: Western Concepts, Asian Experiences

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Agriculture and Rural Development Department

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WESTERN CONCEPTS, ASIAN EXPERIENCES

While reviewing the "state of the art" of artisanal fisheries development, this paper argues for policies that are sensitive to contexts and alternatives. A simple analytic frame is offered to replace general and possibly incompatible intentions with specific, ranked and complementary goals. Compared to production and conservation, distribution as a major concern of marine resource management has received inadequate attention. Yet to those who live in fishing communities, the sharing of the value of the catch is crucial and likely to become more so as marine resources grow scarcer in relation to demand. Also reflecting the increased importance of distributive issues is the assertion of national authority over previously unclaimed oceanic space.

After examining the policy implications of these ideas, the author recommends against integrating a fishery "vertically" (improving catch technology, expanding shore facilities, adding value through processing, reorganizing markets) without also considering the benefits of "horizontal" integration (enabling low-income participants in a fishery to benefit from interaction with nonfishing groups and to respond to opportunities for nonfishing employment) lest well-intentioned developers end up escalating the scale of failure of a fishery that may be or soon become biologically exhausted.

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"I must always regret that the socio-economic fishery questions--the problems relating to the men rather than to material--have not been dealt with by me as of primary instead of secondary importance during three years of inquiry. I recognize now that before we can hope to deal successfully and radically with fisheries we must deal with the fisherfolk in the socio-economic scale, including in this term their whole status as men and members of society, their intelligence and education, their self-respect and independence, their hope for a decent living, their knowledge of and desire for progress."

--The director of fisheries in Madras in 1917
(Blake 1969:258, citing Sir Frederick Nicholson)

"It is not mathematically possible to maximize for two (or more) variables at the same time."

--An ecosystem theorist in 1968 (Garrett Hardin,
as reprinted in Hardin and Baden, eds., 1977:18)

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NOTE AND ACKNOWLEDGEMENT

The type of marine fishery about which this paper is written has been variously described in the literature as "inshore," "small-scale," "subsistence," "artisanal," and "traditional"--as opposed to "offshore," "large-scale," "commercial," "industrial," and "modern," respectively. Each of these adjectives has disadvantages: commercial trawlers sometimes operate inshore, overpopulation can make a subsistence fishery large in human scale, and literally subsistence fisheries whose producers consume their own production are hard to find. Among the least commercialized maritime communities, one can observe respect for the resource and efficiency in its capture that seem ecologically and economically modern, for that label and its antonym are culture-bound and laden with normative connotations. "Artisanal," on the other hand, implies a nonindustrial mode of life in which producers are directly and knowledgeably related to production, and that supports the accent in this paper on changes in the structure of relations between capital and labor. Nevertheless, to avoid monotony, other adjectives will also be used from time to time.

Helpful in various ways, notably in suggesting or supplying material, were Paul Alexander, Yono Astrodihardjo, Daniel Bromley, Francis Christy, Laura Clyburn, Graham Donaldson, Carolyn Emmerson, Robert Hart, Rowena Lawson, John Magnuson, John Marr, Barry Michie, Michael Orbach, Richard Pollnac, William Ricker, Philip Roedel, Scott Schultz, Alfredo Sfeir-Younis, Estellie Smith, Ian Smith, Daniel Speckhard, Gordon Temple, and Emiko Tierney. The author's gratitude is matched only by his responsibility.

ABSTRACT

While reviewing the "state of the art" of artisanal fisheries development, this paper argues for policies that are sensitive to contexts and alternatives. A simple analytic frame is offered to replace general and possibly incompatible intentions with specific, ranked and complementary goals. Compared to production and conservation, distribution as a major concern of marine resource management has received inadequate attention. Yet to those who live in fishing communities, the sharing of the value of the catch is crucial and likely to become more so as marine resources grow scarcer in relation to demand. Also reflecting the increased importance of distributive issues is the assertion of national authority over previously unclaimed oceanic space.

According to standard bioeconomic theory, because the prospect of physical or economic overexploitation is intrinsic to the "common property" nature of marine resources, highest priority should be placed on managing the biomass to avoid physical or economic overfishing. In contrast, a combined biological and anthropological perspective would also emphasize human needs, including those of fishermen who are vulnerably dependent upon marine harvests.

"Bioanthropologically" oriented policymakers would not only try to use marine biological knowledge to ensure the regeneration and harvestability of the living resource; they would also base their decisions as much as possible on the actual circumstances and perceptions of those most directly concerned--fishermen, middlemen, retailers, consumers and others who benefit from the fishery and its products. Development planners would recognize that artisanal fishing covers many different roles and techniques and is normally a part-time activity. Rather than treat such versatility as unprofessional, rather than rationalize a seemingly chaotic or redundant fishery by reducing its participants to a few career producers working full-time with a few powerful techniques, fishery developers would acknowledge technological and occupational diversification as a rational hedge against uncertainty regarding the size, location and weather-contingent accessibility of marine stocks.

Nor would project officials lightly stigmatize the middleman; they would instead understand the reluctance of a fisherman to relinquish the small but certain benefits of an existing arrangement with a familiar broker for the sake of a chance for greater rewards through an impersonal and untried cooperative. It may not be to a fisherman's advantage to trade low gains but low risks in the present for high gains but high risks in the future.

Illustrating the policy implications of these ideas is a concluding recommendation against integrating a fishery "vertically" (improving catch technology, expanding shore facilities, adding value through processing, reorganizing markets) without also considering the benefits of "horizontal" integration (enabling low-income participants in a fishery to benefit from

interaction with nonfishing groups and to respond to opportunities for non-fishing employment) lest well-intentioned developers end up escalating the scale of failure of a fishery that may be or soon become biologically exhausted.

In short, a combined sensitivity to marine resources and maritime communities will prove most conducive to optimal fishery policies in developing countries, notably in the Asian and Pacific cases on which the above conclusions are based.

SUMMARY

i. This paper has three parts. Part I reviews some objectives of artisanal fisheries development. Part II compares different perspectives on fisheries questions. Part III focuses on selected problems of fisheries development policy. Recommendations are made throughout.

ii. Part I argues for clarity about goals. Two definitions of the main task of fisheries development are distinguished: marine resource management and maritime community assistance. Three classes of marine resource management goals--production, conservation, and distribution--are used to show how a simple analytic frame can help to specify aims and estimate their complementarity.

iii. Other goals are also recognized, including those to be reached through maritime community assistance. The point is not to dictate beforehand a single end of development, only to have it proven impractical during project implementation, but to avoid becoming so preoccupied with means, including advanced technologies, that they are allowed to become ends in themselves. Otherwise, project administration--financial disbursement, for example, or the installation of outboard motors--may become its own justification, especially if broader goals are popular and incompatible and thus hard to choose openly between.

iv. In the management of marine resources, governments in the Indo-Pacific region appear, as a whole, primarily interested in catching more fish (production) and only secondarily in bettering lives through fishing (distribution) or in protecting biotic stocks (conservation). Yet conservation enables production to continue, while without distribution the benefits of production would remain unallocated. Consequently, this paper argues for increased sensitivity to questions of conservation and distribution. Combining insights from the two disciplines, biology and anthropology, that have concentrated the most on such questions, a "bioanthropological" approach to fisheries development is proposed.

v. This approach is argued in Part II, after the literatures of biology, economics, law, and anthropology have been evaluated. In biology, a major contribution to fisheries development policy was the formulation of an intuitively reasonable (though operationally complex) physical target: maximum sustainable yield (MSY), the largest quantity of fish, by size, weight, and species, that fishermen in a given fishery can continue to catch. Although MSY ignores distribution, efforts to achieve a maximum recurring harvest of marine foodstuffs can help to alleviate malnutrition and unemployment in the developing country concerned, and the implied incompatibility between production and conservation can encourage the setting of badly needed priorities.

vi. Biologists also pioneered whole-system thinking about marine resources. More recently, however, as biological models have become more complex, computerized, and data-devouring, it has become harder for decision

makers in developing countries to generate or apply them. Fishery statistics should not be so sophisticated that they can only be collected irregularly by outside researchers. The need is for simple and timely data, on boats and trips, tools and catches, routinely reported by fishery participants themselves and openly communicated, orally and on blackboards, throughout the maritime community. If this is done, the onset of diminishing returns to fishing effort, when it occurs, will be more likely to induce support for limitations on entry or gear while incremental adjustments are still possible, and to encourage low-income, full-time fishermen to help prepare their children, if not themselves, for alternative employment.

vii. Much of the literature in economics and law, as well as biology, revolves around the idea that marine space and its contents are by their very nature not subject to appropriation. According to standard "common property" theory, the freely accessible character of marine resources dooms them to overexploitation by fishermen each of whom has no reason to abstain from catching what might otherwise be caught by his competitors. But this argument is not sensitive enough to the contexts in which fishing occurs, to the different patterns of human behavior and motivation that, in different cultures, influence the fishing act and its consequences. The more nations enlarge their claims to maritime jurisdiction, to cite a growing trend, the less axiomatic the notion of open access becomes. As for policy, the exclusionary advice typically drawn from common property theory, that access to the fishery should be restricted, may prove socially unsound in the absence of complementary attention to the fate of those who are not permitted to become or remain fishermen.

viii. Part II also reviews two alternatives to MSY. The first is maximum economic yield (MEY), which is, basically, the greatest margin of receipts over expenditures. By adding input cost and output price to physical effort and catch, MEY enables policy thinking to become more multivariate and, therefore, more realistic. Measuring a fishery's performance against MEY and MSY also raises constructive questions. For example, how much economic inefficiency should fishery officials tolerate in the name of physical production?

ix. In practice, it will often be less important, at least in the short run, to make a fishery economically more efficient than to increase its contribution to nutritional and employment goals, especially where mass poverty renders these urgent. As a policy benchmark in developing countries, MEY is disadvantaged by the likelihood that, for most stocks, its observance will result in a catch by weight that is smaller than what MSY represents. Nor has the usefulness of MEY in low-income situations been enhanced by the tendency of some of its proponents to attribute extreme poverty among fishermen to the intrinsically common property nature of marine resources, underestimating the possibility that land-based arrangements, socioeconomic and political, may also be responsible.

x. More sensitive to that possibility is the second and most recent alternative to MSY as a criterion of policy: optimum sustainable yield, or OSY. OSY is defined, far more broadly than MSY or MEY, as the greatest

benefit to society that can be obtained from a fishery after biological, socioeconomic and political considerations have been taken into account.

xi. Taken merely as an appealing generality, OSY could actually discourage hard choices between priorities. But as an invitation to think through the broad implications and preconditions of specific policies--that is, to select and rank operational goals in a far-sighted, context-sensitive way--OSY could be of great practical value. Such an understanding of OSY could facilitate conscious decisions about the relative incompatibility and desirability of different alternatives--for example, earning foreign exchange, improving the diet of the poor, raising fishermen's incomes through higher beach prices, populating coastlines for security reasons, creating jobs in fishing and fish processing to accommodate the landless thrown out of agriculture, and reallocating excess labor out of an inefficient marine fishery into brackish aquaculture or inland farming and small industry.

xii. OSY retains the biological orientation of MSY, for under both guidelines physical yields must be sustainable. But unlike MSY and MEY, OSY raises the expressly distributive question of who should benefit from the fishery and why, poses a many-dimensional optimum rather than a single-variable maximum, and introduces arguments that serve interests outside the fishery altogether. Because such interests will impinge upon fishery policy in any case, they should be recognized and debated, and priorities between them established. The broad scope of OSY is, in this sense, realistic. Compare the deceptively technical character of MEY in the not unlikely event that the implementation of strictly efficiency-furthering decisions ends up increasing the power of already powerful groups over the absolute poor.

xiii. Developments in maritime law support this argument. Resource scarcity has raised the stakes of fisheries development. To protect such stakes, the limits of national jurisdiction have been extended farther offshore, which has heightened the role in fisheries policy played by government agencies specializing in trade, surveillance and defense. Previously "technical" questions have become more politicized, policy-relevant variables more numerous. The variety, complexity and importance of the contexts in which the physical act of fishing now occurs, all strengthen the case for OSY-oriented decision making.

xiv. Part II concludes by scanning for policy advice three anthropological classics on maritime peoples--by Malinowski on Melanesian and by Firth on Polynesian and Malayan fishermen. These studies argue, in effect, that fisheries developers should understand the existing rules for sharing catches, how in times of scarcity social norms encourage a more equal distribution to guarantee survival, and how the introduction of advanced technology, while increasing the amount of fish caught, can undermine such norms and promote economic inequality.

xv. Anthropological research also casts doubt on some of the assumptions about fishermen implied by common property theory. Even in the 1910s, when he first studied them, Malinowski's Melanesian islanders were not entirely isolated from outside influences. The image of fishing villages

cut off from larger societies is far more obsolete today. Fishery policy analysts should not deduce human behavior from the physical character of marine resources without also taking into account the many land-based socioeconomic and political forces that have penetrated and shaped maritime communities.

xvi. In relation to Asian and Pacific experience, common property theory may also have exaggerated the individualistic or gambling spirit that supposedly drives fishermen back to the sea time and again to catch less and less. Fishermen may be trapped in a biologically declining fishery not for psychological but for structural reasons--because they lack the education or opportunity to escape. The crucial importance of catch sharing indicates that, despite traditionally open access to marine resources, fishermen are subject to social regulation that helps the community survive dearth; they rarely act as purely selfish or acquisitive men.

xvii. A detailed review of Firth's Malayan findings supports these conclusions. Over a quarter century, the coastal village of Perupok experienced technological change, demographic growth and class stratification. Ownership of productive equipment became concentrated in proportionally fewer hands. Loan-secured, preemptive marketing arrangements arose whereby crews indebted to a financier were required to turn all their catches over to him for sale. The buying power of ordinary fishermen improved hardly at all. Such trends suggest that fisheries developers, rather than uncritically facilitating modernization, should try to prevent or mitigate its socially negative consequences.

xviii. In sum, while recognizing the economic opportunity costs of fishing compared to other activities and the limitations on free access made possible by recent trends in maritime law, artisanal fishery policymakers in developing countries would do well to root their calculations in the physical prospects afforded by the resource and in the socioeconomic structure and norms of the adjacent community--that is, using a bioanthropological approach, to determine and pursue ranked goals of marine resource management and maritime community assistance.

xix. Part III addresses specific problems of fisheries development. As a tool of policy, the dictionary definition of a fisherman as someone who fishes for a living is virtually useless, because it implies a full-time occupation and highlights the act of capture. In most tropical developing countries, fishing is not a sole career but an intermittent and contingent activity whose prey, techniques, roles and outcomes vary greatly within and across physical settings. Data from the Philippines and Indonesia, among other Asian-Pacific countries, illustrate this variety in fish species, capture methods, and specialized tasks. Many persons without whom capture could not occur do not go to sea at all.

xx. The inhabitants of a maritime community are normally far more aware of such fine distinctions than nonresident visitors are. The latter's homogenizing vocabulary of "fishing" and "fisherman" must be unpacked and its diverse referents specified empirically for each unique fishery if local

realities are to be seen as those who live them do. Not only will local inhabitants be more likely to cooperate with developers who have recognized and overcome this problem of misperception, but outsiders, having reoriented themselves, should be able to make better recommendations. Knowledge of the complex relationships between people and fish should encourage sensitivity to the possibly ramifying effects of proposed changes in technology on local webs of interaction. Given the productionist bias among Indo-Pacific governments noted in Part I, this disaggregation of perceptions could also help to rehabilitate distribution as a development goal, by broadening the notion of fisherman-as-producer to include his position as one among many sharers of catch value.

xxi. Evidence from several Asian countries demonstrates the occasional character of artisanal fishing. Yet the typical development project is meant to help full-time fishermen, and if it succeeds, other villagers may be attracted to fishing careers. In view of the need for regular loan repayments through steady production, this preference is understandable. Yet alternating between fishery and nonfishery jobs may be a sign of skill in maximizing security if not also income, given the unpredictability and risks of marine fishing. Philippine data illustrate the case for not stigmatizing part-timers as unprofessional or undisciplined if on closer inspection the opportunity costs of full-time fishing are high. Especially if pressure on the resource needs to be reduced, occupational mobility among fishermen can be an asset, not an obstacle.

xxii. Before urging fishermen to reorient themselves, policymakers should consider following their own advice. In particular, substantive rationality, or choosing the "right end," should not be confused with instrumental rationality, or choosing the "right means." The fisherman who rejects a development project may prefer the customary guarantees of a familiar middleman to the hypothetical profits of an untried cooperative, even if as a member of the new organization he could raise his income. Developers who find substantively irrational his preference for low-risk security over high-risk gain and his consequent unwillingness to cooperate should realize that his reluctance may be instrumentally rational given his priority goal. The failure of a fisheries development project in Muncar, Indonesia, illustrates these ideas.

xxiii. The problem of overemphasizing technology is presented next. Indonesian, Indian, Sri Lankan, and Malaysian experiences demonstrate the inadvisability of introducing new catch and processing methods without adequate regard for the local settings in which they are expected to operate.

xxiv. Broadly speaking, to become effective and legitimate, an innovation must become locally rooted. To improve a project and its chance for success, older informants should be interviewed on the fate of previous innovations. Successful changes often originate from a few entrepreneurs and radiate through the community along networks of friendship and respect. Knowledge of the composition of such webs should prove useful to developers in initiating, adapting and institutionalizing change. The likely distributive (e.g., labor-displacing) effects of a proposed innovation can be

estimated and the instrumentally rational concerns of potential opponents, if possible, accommodated. Alongside a labor-displacing fishery project, developers might wish to train fishermen or their children in nonfishing skills--handicrafts, mechanical repair, agriculture, even elementary business methods--for which a demand exists or can be set in motion. Ways of making community members themselves feel more responsible for marine resource development are also suggested in Part III, including the use of open project management and existing credit networks to promote group responsiveness and obligation.

xxv. Another important problem in fisheries development is what to do about middlemen. Too often they are seen by policymakers as exploiters to be ousted or bypassed. Yet, unlike project personnel, many middlemen are personally known to the fishermen whose catches they market. Middlemen who absorb the risks in fish marketing meet the fishermen's need for security. From a fisherman's standpoint, indebtedness to a middleman may represent not usury but a relationship useful to both parties. Sri Lankan findings exemplify these possibilities.

xxvi. Like fishermen, middlemen vary. In Indonesia's Muncar fishery, for example, one man loans money to another to pay for a hull, gear and expenses, and a tie between financier and owner results. Part of this loan is reloaned to a crew, creating a tie between owner and seagoing producer. The crew must now relinquish each catch to the financier, who sells it on credit to a wholesaler, yielding a relationship between financier and dealer. The dealer then sells the catch to another dealer, who sells it to yet another, and so on through several transactions until cash is finally paid back through the chain of credit to the crew on the beach. The financier, the owner and the dealers are all middlemen, but their roles differ widely, as do their profits and even their sex, for many of them--especially dealers--are women.

xxvii. Because of this diversity, developers should not deprecate middlemen in general. Instead, in each particular case, they should find out what these men and women actually do. (To illustrate, a middleman in Muncar may perform one or more among seven different functions: ownership, financing, wholesaling, transportation, processing, retailing and fishing itself.) If these tasks are necessary and constructive, if project management is unwilling or unable to assume them, and if they are unlikely to be performed at all in the absence of middlemen, then project officials should cooperate, at least temporarily, with local intermediaries.

xxviii. While investigating the actual positions of middlemen, developers should also trace the marketing chains that connect producers through brokers to consumers. Which participants in a given chain pocket the greatest and lowest proportional and absolute margins of total return over cost? Are high and low margins correlated with high and low risks, respectively? That is, do middlemen seek to maximize profits in part to protect themselves against uncertainty? If so, can these profits be shifted to producers without making the latter either so vulnerable to risk that the project fails, or so dependent on project authorities that development does not become self-sustaining?

Evidence from India, Sri Lanka, and the Philippines suggests the advisability of estimating not only the spreads between returns and costs accruing to different brokers but also the likely repercussions along the marketing chain of any effort to redistribute earnings in favor of low-income producers.

xxix. This issue of vulnerability and dependence lies at the heart of the final problem discussed in Part III: integration. Vertical integration typically means expanding shore facilities, adding value through processing and reorganizing markets. In the process, governments become more involved in, and exert more control over, the entire sequence of fish-related transactions. The widespread popularity of vertical integration in development advisory circles in the 1970s reflects earlier lessons learned: that improving catch technology at sea without also improving fish-preserving and price-sustaining mechanisms on land can ruin fishermen by glutting markets, and that moving against powerful middlemen without also controlling supply at the source can disrupt marketing chains to the point where developers have to back down.

xxx. But a new problem created by vertical integration has not received much attention: namely, that by increasing its investment in, and responsibility for, a fishery, a government may escalate the future failure of a fishery that is already, or soon will be, biologically overworked. In contrast, in a horizontally integrated project, participants are enabled and encouraged to take advantage of opportunities outside the fishery if these seem more promising than those within, while the rest of the community is involved as much as possible, through consultations and spinoffs of various kinds, in the development process.

xxxii. The point is not to choose between these two strategies as if they were exclusive alternatives, for they are not. But resource-short governments that already face many other problems cannot be expected to integrate their fishery projects vertically and horizontally at the same time. Needed are clear priorities and an awareness of the circumstances that call for more or less of either response.

xxxiii. Timing is important. At the very outset, an especially strong case can usually be made for integrating a small pilot project horizontally with its socioeconomic environment to win local acceptance and to keep open the option of shifting labor out of the fishery. If the project succeeds in raising production, vertical integration may become more urgent, lest processing and marketing bottlenecks lower beach prices and returns to crews. Eventually, however, the need for horizontal integration may arise again, if differential access to technology and facilities has divided the community into benefited and bypassed groups.

xxxiiii. Potential dangers accompany the raising of official stakes in a vertically integrated project. The more a government invests and the more it seeks to control the handling of fish, from origin to final disposition, the more it may tend to confuse project success with development itself. To expand the list of relevant factors is not necessarily to justify centralizing control over them. Realism requires an early listing of the roles and

conditions that officials will not try to control. Changes in these autonomous variables and baselines can yield corrective information on project performance. Conversely, the more a government's role is enlarged to protect an endangered commitment, the scarcer and less reliable such feedback will be.

xxxiv. If vertical integration, as marine resource management, deals comprehensively with fish, and if horizontal integration, as maritime community assistance, does so with people, then fully contextual development would depart, bioanthropologically, from both premises, that fish and people are important. The resulting "diagonal" integration would represent the unique slant that best fits a particular case at a particular time.

xxxv. To conclude: In between the highly vertical version of "ocean production" exemplified by the capital-intensive, distant-water fisheries of Japan or Korea, on the one hand, and the clearly horizontal "rural employment" strategy recommended by Firth for his Malayan coastal village, on the other, lies a rich set of possibilities for artisanal fisheries development. The point is to adopt a perspective from which to recognize, in a specific context, the trade-offs between committing fishermen and funds to full-time fishing as a commercial enterprise and subsuming or even dismantling the fishery under the rubric of rural development.

I. OBJECTIVES

The developer must determine whether his primary purpose is social or economic. A lack of conscious purpose on his part or a confusion of basic objectives can quickly lead into the mire.

--A fisheries businessman (Payne 1973:2322)

1.1 The most serious and widespread weakness in artisanal marine fishery development is a preoccupation with means to the neglect of ends. Compared to a general fascination with technique, scant efforts have been made to specify different goals clearly, to estimate their mutual exclusiveness or complementarity when combined or pursued in different ways, and to order them preferentially in terms of their likely political, social, economic, ecological, and biological costs and benefits. Narrow questions (how to introduce a new boat, motor, or net) have tended to absorb attention that should have been spent on broader ones (why the volume of fish production should be enlarged at all). Too many feasibility studies have been made when "desirability studies" were needed. In the rush to solve problems, too little time has been spent defining them first. 1/

1.2 Overemphasis on projects as embodiments of development reflects and reinforces this imbalance. The vaguer a project's goals are, the less aware will its planner be of any conflicts between them, and the more vulnerable will project personnel become to routine pressures to disburse and implement on behalf of project success as an end in itself. Because a project is conveniently demarcated in space and time and typically designed at least in part to introduce, augment or repair a quantifiable stock of tangible equipment, it is easy to read the process of development into the progress of a project and to measure progress as the provision of hardware. Conversely, it is hard to keep asking and trying to determine whether project beneficiaries are being equipped to do things that are qualitatively worthwhile in terms not merely of the project but of broader development goals.

1/ "What do we want," asked a Sri Lankan fisheries expert,

to achieve by fisheries development? Supply fish as protein at any cost to a protein-starved population? Ameliorate the terrible economic condition of an important segment of our community? Save foreign exchange? Justify political slogans? Or even prove the advantages of one particular type of administrative organization [the cooperative] over another for economic development? ... We were not sure whether to foster the co-operative spirit among fishermen or to try to develop fisheries. We ended up by achieving neither. ... Let us by all means run towards our goal, but let us be sure first where we want to go [de Silva 1964:259-260].

1.3 What can be done? As their first order of business, governments and other interested parties (including the maritime communities themselves) should articulate or reformulate their policy objectives. An ordinary goal may be desirable but not achievable, or achievable but not desirable; it may be pursued or rejected in isolation from other goals, or it may be added to other goals and all may be pursued (or rejected) as equally (un)important. A policy objective should be both wanted and realistic, and it should appear in a list of such objectives ranked by importance and scheduled in sequence for specified reasons. Evidence for, and assumptions about, the relative tension or mesh between different objectives should be clearly stated. Then, as implementation proceeds, the original set of ranked objectives and reasons for rankings can be altered in the light of experience. (Cf. Rothschild 1973:2021.)

1.4 Policy objectives, in short, are operational priorities, and they are as rare in development as good intentions are common. If "the core fallacy of the idea of progress is the notion that it is possible to optimize everything at once" (Slater 1974:3), the core task of development analysts should be to help policymakers (including members of policy-affected groups and communities) explicitly, preferentially and sequentially to link potentially incompatible ends to scarce means. Indeed, to determine policy objectives in this manner--by acknowledging limits, making conscious choices and engaging in creative conflict with oneself and with others--is to rehearse the values of development itself.

1.5 In fisheries policy, the most basic decisions are not technical but conceptual. Will the task of development be defined mainly as helping maritime communities or managing marine resources? A politician is likely to answer, "Both." The idea of helping communities to manage resources also seems felicitous. But such happy combinations can generate unhappiness when tasks that appeared in theory reinforcing turn out in practice to undermine one another. (Cf. Kesteven and Williams 1971:78, 81-82.) If the fishermen need more fish and the fish need fewer fishermen, developers will be hard-pressed to have it both ways.

1.6 If the task is to help a maritime community, policy objectives might be selected from classes of goals such as amelioration (to improve its welfare), regulation (to reform its behavior) and participation (to empower its members). Is the priority condition to be overcome poverty, maladaptation or powerlessness? If these conditions are interdependent arcs in a vicious circle, which one should be broken first? If the community's material circumstances are initially ameliorated through outside intervention or subsidy, will prospects for participation be damaged as fishermen learn the benefits of dependence? If the community is instead regulated by limiting its access to marine resources to prevent overfishing, by outlawing traditional marketing arrangements as disadvantageous to fishermen, or by taxing the catch on behalf of a cooperative to encourage savings, will the resulting cleavages--between those granted and denied access to the sea, between private brokers and public managers trying to control the market and between cooperative members and nonmembers--inhibit the amelioration of the community's general welfare? If autonomous participation is assigned first

priority, will the rate at which the community discounts the future benefits of current restraint be so high as to make regulation more necessary, belated and repressive?

1.7 If the task is primarily to manage a marine resource, policy objectives could be drawn from classes of goals such as production (to exploit the resource), conservation (to protect it) and distribution (to share it). Under these headings, Table 1 poses some questions that decision makers might address in order to determine how harmonious or discordant different combinations of goals are, select some empirical phenomena worth researching in order to answer the questions, and thereby try to facilitate the screening and transformation of broad aims into policy objectives. By inserting their own goals into such a frame and inferring from them relevant questions and topics, decision makers should become more able to estimate and compare (in)compatibilities, pinpoint needed information and thus ultimately create operational priorities that support or at least do not defeat one another.

1.8 Marine resource management and maritime community assistance do not exhaust the ways of defining development tasks. One could refocus farther inland on rural-agricultural or urban-industrial constituencies and activities and ask how fisheries might serve these. Extending the sphere of policy seaward, one could ask how fisheries might earn foreign exchange. With each redefinition and rejustification of the primary task, with each respecification and reordering of its objectives, policy horizons could be stretched, more reflective (rather than reflexive) leadership facilitated, and opportunity cost-conscious decisions encouraged. 1/

1/ Consider this statement by Marr et al. (1971:8) in their plan for the Indian Ocean: "The objective of fishery development is taken to be to contribute to general economic development. Providing sources of foreign exchange, employment, or protein are all considered to be sub-objectives of this main objective." Because the same fish cannot be exported for foreign exchange and consumed domestically for protein, should certain species be allocated mainly to one or the other use? If research shows that making a particular (overexploited) fishery more labor-intensive for the sake of employment will probably hurt net returns in foreign exchange from exports, should the fishery be made instead more capital-intensive, access-limited, and value-adding in order to generate more foreign exchange for partial reinvestment to create employment opportunities inland for the fishing labor such a policy would displace? Is the income elasticity of domestic demand for fish compared to other proteinous foodstuffs such that, other things being equal, increasing employment and incomes will disproportionately raise the retail value of nonfish vs. fish protein on local markets, or will domestic demand for more prestigious fish species previously marked for export go up proportionally more than that of species previously meant for consumption, putting competitive pressure on the goal of maximizing foreign exchange? Officials who define fishery goals as means to, or components of, "general economic development" should disaggregate the latter, for "subobjectives" may not be inherently conducive to a specified set of ends, or, as ends, compatible with each other.

Table 1: A SIMPLE FRAME FOR PREPARING POLICY OBJECTIVES IN MARINE RESOURCE MANAGEMENT

Policy Goals	Policy Questions	Research Topics
P R O D U C T I O N vs. C O N S E R V A T I O N		
<u>P1.</u> Increase fishermen's productivity	<u>P1-C1:</u> Will limiting fishing technology help increase fishermen's productivity? If not, which is more important, and why?	State of biomass, effects of gear limitation, effects of excluding or licensing foreign competition, capacity to exploit controlled zone, domestic fishermen excluded from fishery
<u>P2.</u> Increase fish production	<u>P2-C2:</u> Will ending open access help increase fish production? If not, which is more important, and why?	
C O N S E R V A T I O N vs. D I S T R I B U T I O N		
<u>C1.</u> Limit fishing technology	<u>C1-D1:</u> Will limiting fishing technology help raise fishermen's incomes? If not, which is more important, and why?	"Appropriate" technology, marketing and middlemen, nonfishing employment, investment for domestic vs. foreign markets, disposition of product and rent from controlled zone
<u>C2.</u> End open access	<u>C2-D2:</u> Will ending open access help improve rural nutrition? If not, which is more important, and why?	
D I S T R I B U T I O N vs. P R O D U C T I O N		
<u>D1.</u> Raise fishermen's incomes	<u>D1-P1:</u> Will increasing fishermen's productivity help raise their incomes? If not, which is more important, and why?	Returns to producers, ways of sharing catch value, income distribution, food habits, price formation, price and income elasticities of demand
<u>D2.</u> Improve rural nutrition	<u>D2-P2:</u> Will increasing fish production help improve rural nutrition? If not, which is more important, and why?	

Note: Numbers "1" and "2" do not indicate priorities; it is assumed that priorities have not yet been determined. The goals, questions, and topics listed merely illustrate the possibilities. For example, "improve rural nutrition" could as easily read "increase rural employment." Policymakers would then be guided to ask themselves and their staffs under what (if any) circumstances boosting fishermen's productivity (P1), enlarging the catch by volume or value (P2), curtailing destructive technology (C1), and limiting physical entry to the fishing zone (C2) could be expected to help reduce rural unemployment (new D2).

1.9 The need for such a synoptic exercise is demonstrated by the results of an open-ended survey of the fishery development goals of 20 countries in the Indo-Pacific region (Lawson 1974). By far the most frequently stated aims were to produce enough fish to satisfy domestic demand and to produce more fish for export. Nearly every country wanted to maximize two or more of these things: profitability, employment, catch by weight (for domestic consumption) and catch by value (for export and to raise fishermen's incomes). Although governments were asked to rank their aims according to importance, many appeared insensitive to incompatibilities between the different things they wished to achieve. 1/

1.10 On the other hand, most respondents wished mainly to catch more fish. Of the top ten goals (those mentioned by two or more countries), five could be classified as productionist (to produce more for domestic or overseas consumption, to expand fisheries generally, and to develop noncapture or distant-water fisheries), three could be called distributionist (to improve fishermen's welfare, to increase employment and to develop fishermen's cooperatives and associations), and only one even implied conservation ("to evaluate fish potential"). By popularity (the percentage of all mentions accounted for by each class of goals), production dominated (71%), followed at a great distance by distribution (21%), with conservation last and least (4%). 2/ Only one of the 20 governments actually listed a desire "to conserve stocks." Insofar as the world food crisis is less a problem of underproduction than of maldistribution and poor conservation, these priorities would appear misplaced. 3/

1.11 While reviewing the literature and discussing selected cases, assumptions, and issues in artisanal marine fishery development, including many of the research topics listed in Table 1, this paper will make

1/ For a concrete example of overoptimistic planning, see the recommendations for fisheries development in Kerala made by the National Council of Applied Economic Research (India 1962: ch. 5), which appear to rest on the assumption that local protein consumption, foreign exchange earnings and fishermen's incomes can be simultaneously increased.

2/ Lack of access to the original responses makes this classification somewhat arbitrary. Among the ten goals, one (mentioned by two governments) was ambiguous ("to prepare development projects") and has therefore been omitted, which explains why the percentages total less than 100. (Cf. Lawson 1974:106.)

3/ One could argue on linguistic grounds that asking "What are the Government's main objectives in developing fisheries in your country?" (Lawson 1974:120) preselected productionist answers because developing a fishery is generally taken to mean producing more fish. If that is so, however, it only reiterates the need to redefine fishery development in the broader terms of resource management, community assistance, and national (if not world) welfare.

recommendations. In any fishery or fishing community, however, for which policy questions have not yet been researched nor policy objectives fashioned, specific advice from outsiders will prove hard to evaluate and use. For the "appropriateness" of any technology, including even a minor piece of software such as this, is a feature not of the tool itself but of its adaptability to host environments and priorities (McInerney 1978:43-47). Those environments must be known and priorities for their transformation decided if development, as a process of conscious understanding, choice and action, is to succeed.

II. PERSPECTIVES

"My personal preference is for a technocentric approach, with the fish first, the economics second, and the social problems a distant third."

--A fisheries biologist (Larkin 1977:10)

2.1 What is the task of fishery development? Resource management? Community improvement? For most writers, the choice of perspective has been guided by a prior choice of discipline. Biologists have sought to manage biotic stocks to assure their continued availability. Economists have advocated business management lest returns equal costs and net incomes disappear. Legal experts have proposed rules governing access to, and conflicts over, oceanic resources. Using knowledge of fishermen and how they feel and behave in relation to one another and to the sea, anthropologists have stressed the human side of development. And these choices of perspective have entailed methodological choices between uninvolved and participant observation, hard and soft evidence, formal and informal models, macro- and microanalysis.

2.2 A farm is visible, tangible, bounded and stationary. A marine capture fishery, strictly speaking, is none of these. Fishing is therefore more amenable than agriculture to reconstruction in the image of the writer's discipline. If distinguishing contradictory from companion goals is an overdue exercise, no less urgent is the need for an interdisciplinary overview of fisheries-related literature. 1/ Not only have authors with different specialties recommended different goals, but different perspectives have typified the same discipline at different times, as illustrated by Table 2.

1/ Intradisciplinary literature reviews, although their quality varies, already exist. Of the disciplines cited in Table 2, for example, the most self-consciously synthetic is marine biology; Larkin (1977), Regier (1977), and Ricker (1977), all ably review the "state of the science." In economics, ch. 2 of Bromley (1969) is useful but partial and out of date, while the best current introduction to the field, Anderson (1977), is not explicitly bibliographic. For mathematical bioeconomics, the literature notes in Clark (1976) are valuable but brief. So underdeveloped is the political economy of fisheries that a recent survey could claim to be "the first comprehensive textbook and reference source in this field" (Bell 1978:xxvi). In law, the highly synthetic work of McDougal and Burke (1962) and Johnston (1965) remains unsurpassed, although more recent events and concepts have been covered, respectively, by Pabst (1976) and Hargrove (1973). Much of the anthropological work is cited by Pollnac (1976), but his paper is less a review of the literature than an effort to use it to show how physical aspects of the marine environment are correlated with social and psychological characteristics of artisanal fishermen; Nishimura (1973), though also valuable, is just the opposite: more descriptive than analytic.

Table 2: AN OVERVIEW OF FISHERIES-RELATED LITERATURE,
BY PERIOD AND DISCIPLINE

Classical Period (pre-1950s)	Neoclassical Period (1950s and 1960s)	Recent Period (1970s)
<hr/>		
M A R I N E B I O L O G Y		MARINE ECOLOGY
Baranov (1918) Russell (1931) Graham (1935)	Schaefer (1954, 1957, 1959) Beverton and Holt (1956, 1957) Ricker (1958) Schaefer and Beverton (1963) Cushing (1968)	Kesteven (1972) Gulland (1974) Steele (1974) Cushing (1975) Cushing and Walsh, eds. (1976) Hall and Day, eds. (1977)
R E S O U R C E E C O N O M I C S		WELFARE ECONOMICS
Gray (1914) Hotelling (1931)	Gordon (1953, 1954) A. Scott (1955, 1957) Crutchfield and Zellner (1962) Christy and A. Scott (1965)	Arnold and Bromley (1970) Southey (1971) Bromley (1976, 1977) Bromley and Bishop (1977)
MERCANTILE LAW	I N T E R N A T I O N A L L A W	
Grotius (1609) Selden (1635)	McDougal and Burke (1962) Johnston (1965)	Alexander, ed. (1973) Hargrove, ed. (1975) Kaczynski (1977)
ECONOMIC ANTHROPOLOGY	COMMUNITY STUDIES	MARITIME ANTHROPOLOGY
Malinowski (1922) Firth (1946)	Norbeck (1954) Fraser (1960)	Pollnac (1976) Smith (1977, ed. 1977)

Note: For full information and annotation, see REFERENCES.

2.3 The table orders four disciplines from top to bottom: biology, economics, law and anthropology. Roughly, the "higher" the discipline, the larger its share of the scholarly literature on fisheries. That is why "lower" disciplines show fewer references. The rule used to select references was that earlier works be recognized as pioneer or basic and that later ones extend or revise these to form a major conceptual trend within each specialty. This was easiest to do for biology, the most "advanced" of the disciplines in the sense of cumulating rather than merely accumulating knowledge. 1/

1. Biology

2.4 In biology, Baranov (1918) pioneered a mathematical approach to the interaction between the intensity of fishing effort and the condition of the stock at which it is aimed. Some of his assumptions were unrealistic (Ricker 1975:309-310), and by focusing on the catch he underestimated ecological variables, but he did refute the naive view that a fishery has no effect on the abundance of fish (Baranov 1925:7). And his work encouraged others--Russell (1931), for example--to study the problem of biological overfishing, a problem that in the "neoclassical" 1950s and 60s helped turn into dogma the idea that fishery experts should calculate, and fishermen should take, only the maximum sustainable yield (MSY). "Briefly," wrote Larkin in retrospect (1977:1-2), and only half-facetiously,

the dogma was this: Any species each year produces a harvestable surplus, and if you take that much, and no more, you can go on getting it forever and ever (Amen). You only need to have as much effort as is necessary to catch this magic amount, so to use more is wasteful of effort; to use less is wasteful of food. Basically, it was a puritanical philosophy in which the supreme powers were pretty harsh on people who enjoyed themselves rather than doing precisely the Right Thing. Armed with scientific knowledge about the number of fishermen and technological advances, the manager could use regulations to prevent the catch from exceeding the maximum, even if it meant telling fishermen they could only use bare hooks from sailboats on alternate Tuesdays between 6 and 7 p.m. The various laws of supply and demand, marginal revenue, alternative options, and psychological dissatisfaction, were mostly misty mumblings of the social sciences. It was generally assumed that the fishermen would look after themselves. ... "Study the Fish" was the motto.

1/ Marine ecology has not replaced marine biology; the latter's more traditional interests still guide research. See Ricker (1975) and Gulland (1977), for example, on the now-standard subject of fish population dynamics. Yet ecosystem modeling is unquestionably the "new look" in the discipline. Witness the succession of titles written or edited by Cushing, from Fisheries Biology: A Study in Population Dynamics (1968) to Marine Ecology and Fisheries (1975) to The Ecology of the Seas (1976).

And the motto underscored the neoclassical aspect of the times it accompanied, the heyday of MSY in the 1950s and 60s, for the study of fish population dynamics, innovative though it was, retained the ichthyological orientation of earlier work.

2.5 The intellectual triumph of MSY was a political victory for fisheries biologists. In the classical period (before World War II), rarely had their science been able to compete with "the interest of established pressure groups" (Gulland 1974:2) in influencing the decisions made by fishery managers. But by the 1960s, managers who wanted to ensure the ongoing harvestability of the resource found a ready tool in the work of men like Schaefer, Beverton and Ricker, who had begun to develop sophisticated but calculable catch equations to maximize present and future returns from the living aquatic resource. In time, however, even the scientists were willing to admit that the fish-centered idea of MSY ignored too much to be enthroned as the sole objective of fishery management. Having struggled against the "irrational" exploitation of the resource, their own overreaction became vulnerable to the same charge.

2.6 As Regier (1976) has noted, the succession of perspectives in fisheries biology also reflects the progression of stages in the development of a typical fishery. An exploratory stage of trial fishing to select and adapt gear to a relatively untouched biomass requires basic description to identify the resource and determine its hydrographic and seasonal distribution. As fishing effort expands through the most to the less profitable stocks, the dynamics of the (fish) population become increasingly important. If and when biological overfishing occurs, the threatened viability of the resource imposes an ecological perspective. Partly in response to this series of experiences, fisheries biology has expanded its task from the identification of individual fish (taxonomy) through the analysis of whole species behavior (population dynamics) to the study of whole systems behavior (ecology). Today, fisheries biology, according to Regier, has already begun to answer a fourth challenge of experience: how to rehabilitate the resource after its depletion, through biological overfishing and pollution, by manipulating and artificially augmenting the fauna's and the environment's own capacities for regeneration--"therapeutic ecology," in Regier's phrase. 1/

2.7 This trend toward ecosystem analysis and manipulation--reflected in the recent works in biology shown in Table 2--has three important implications. First, it requires the incorporation of more observations on more variables at more points in time. Data on the size and composition of catches are not enough; if it is to be accurately modeled, the environment must be continually monitored on a variety of dimensions--including, for example, the locations and strengths of ecologically destabilizing pollutants (Vernberg et al. 1977). Second, however, this empirical inclusiveness pushes

1/ Compare Kesteven (1972:242ff.), who sees a trend from "apography" (an object-classifying science) to "syntactics" (a relation-discerning science) and from static to dynamic or explanatory analysis.

ecosystemic thinking toward formal abstractions that exclude the idiosyncrasies and randomness of natural behavior lest these infiltrate, complicate and incapacitate the model. Recent efforts to compose mathematical systems that will describe and predict the behavior-in-context of any renewable resource--from a stock of fish to a stand of trees (see May 1973, Smith 1974, and Hall and Day, eds. 1977)--are predicated upon this Promethean assumption that general-theoretical structures can be freed from, in order to improve, the particularistic-empirical world in which they originated. And this assumed capacity for control, both intellectual (reality simulating) and physical (reality manipulating), is a third requisite of successful ecosystem modeling. It is no coincidence that the whole-systemic trend among biologists writing on marine fisheries management originated inland with small bodies of fresh water more easily studied and influenced by man. 1/

2.8 In the marine resource policy environments typical of the developing countries, these needs for information, abstraction, and control are hard to meet. Monitoring tends to be sporadic or absent, a lack of reliable data inhibits generalization, and weak institutions or vested interests are likely to impair the implementation of any advice, model-derived or not. In such a setting, computerized systems-analytic techniques can have several ill effects. Exotic technology may be used as another distance marker between urban policymakers and rural objects of policy, just as experts sometimes use jargon to affirm their in-group status. Excessive faith in the new quantitative methodology may lead its users to disparage qualitative evidence as anecdotal, dismiss folk wisdom as unsophisticated and discount their own intuitive judgments when these are based on informal personal experience rather than formal scientific education. The sheer prestige of high technology in humble surroundings may invite confusion between means and ends, between printout on paper and output in practice, of the sort already discussed.

2.9 The usefulness of biology for marine resource management in such circumstances is twofold. First, because knowledge of what is being done to living resources and where they are on their reproduction curves is essential to realistic decision making (Roedel 1975:85), MSY retains great heuristic value. By specifying a physical yield that can be estimated for each species in a stock of fish, MSY offers an objective benchmark for use in setting goals. By implying a trade-off between production and conservation, the qualifier maximum but sustainable helps to make goal setters aware of scarcity

1/ Innovation is thus in part renovation. Chinese records mention the management of freshwater ponds as early as 1100 B.C. (Linn 1940), three millenia before the "dynamic pool" modeling of Russell (1931) and Graham (1935), while within Western marine biology, current ecosystemic concerns point away from narrowly fish-focused population dynamics toward a saltwater version of "old fashioned" limnology. What is distinctively modern is the effort to extend and adapt closed-system models to open environments, as in the embryonic science of oceanic aquaculture (Hanson, ed. 1974).

and incompatibility. And although MSY ignores distribution (what happens to the fish after capture), by enabling the greatest possible continuing extraction of nutritive material from the sea, the concept implies a preference for consumption over profit that may appeal to decision makers who work with poor, malnourished populations.

2.10 The second contribution of biology is to encourage systematic thinking about marine resources. The difficulty lies in making the methodology not only available to untrained local users but also permeable by complex local realities. This two-way nature of development as a learning experience deserves underscoring. Too often, inserting advanced techniques into a development process helps it to become, even more than before, a stream of unilateral acts flowing from experts down to laymen across widening disparities in knowledge, status and power.

2.11 To avoid this, the technology of systems modeling needs to be "stepped down" to make it usable by people who live in affected coastal communities. ^{1/} It is unrealistic to expect indigenous knowledge of exactly which variables cause how much change in the mortality rate of a given species, or whether or how much a change in that rate will influence the rates of other species in the same stock, but it is less unlikely that fishermen and managers can cooperate in keeping approximate track of three crude but crucial indicators of a fishery's biological health: fishing effort, catch weight and catch composition (cf. Yap 1977:37). A fall in total catch weight, a fall in catch weight per unit of fishing effort or a rise in the proportion of juveniles caught suggests that the fishery may be expanding beyond its biological limits; in concert, they warn that it almost certainly is.

2.12 In theory, these three variables could be differentiated and refined: by boat size, crew size, trip length and equipment used; by the species, sex, and age of fish and their place of capture; by controlling for seasonal fluctuations. Enforcement at sea could reduce the statistical leakage that occurs when catches are not landed but sold boat-to-boat. But if all such improvements are attempted, means will quickly swallow ends, and the resulting information will belong more to the officials who took such pains to collect and process it than to the fishermen whose interests will be most affected by its use. Simple but ongoing coverage by fishery participants themselves is preferable to sophisticated but one-time research by outsiders.

2.13 Insofar as bureaucracies insulate information from market forces, the demand for it is price-inelastic, yet, like wild fish, it is an elusive

^{1/} The prospects for an "intermediate methodology" suited to developing countries are not helped by the idea--understandable in an industrial culture but perfectionist in a preindustrial one--that "until we go into computer programmed models we will continue flying by the seat of our pants," to cite a former fishery administrator from California (Croker 1975:77).

resource and therefore costly to obtain. Officials might try to specify a "minimum sustainable yield" in data--"minimum" in the sense of routinely furnishing timely knowledge of crucial conditions while not being unnecessarily (in biological terms) or inefficiently (in cost-benefit terms) specialized or extensive (cf. Crutchfield 1975:17), and "sustainable" in the sense of appearing in fishermen's eyes intuitively worth collecting. Open communication of these data--orally and on blackboards in a public place, for example--should promote among fishermen a proprietary stake in statistical reporting by providing baselines against which each crew can measure its own performance.

2.14 If the notion of falling rates of increase (diminishing returns) can be communicated in this way, perhaps advisable limitations on entry or gear could be made understandable while they are still incremental and preventive. Above all, by sharing such information, full-time fishermen whose precarious incomes might have made them insensitive to long-run social as opposed to short-run personal or familial needs could be encouraged to think in the former terms. The sooner a fisherman becomes aware of the long-term prospect of ecological overload in the sense of too many people hunting too few fish, the sooner he may consider alternative employment for his sons--assuming, of course, that alternatives exist.

2.15 While the methodology of biological monitoring is being simplified and popularized, locally standard ways of appreciating marine phenomena should be studied and, if possible, "stepped up" to become more scientific. If conservation means "wise use," artisanal fishermen are too often assumed to be stupidly profligate in exploiting the resource. For it is they, not outsiders, who are intimately familiar with, and dependent upon, the neighboring sea. In Hong Kong, knowledge among boat dwellers of nearby waters and their contents is "exceedingly detailed, pragmatic and sophisticated" and "usually in full accord with the findings of local marine biologists" (Anderson 1969:443). When fishing communities "replenish" the sea through periodic ritual offerings (Mander 1956-57), they show an awareness of the limits of uncompensated extraction that their governments, at least those whose indifference to conservation as a development goal has been noted, have yet to learn. A personally advantaged urban official seeking outlets for excess demand for jobs and food on land may find it easier to believe the wishful myth of oceanic plenty than a fisherman whose poverty is a constant reminder of limits (cf. Foster 1965). If, as Regier (1976) suggested, fisheries biology and fisheries development have progressed from basic taxonomic to advanced ecosystemic concerns, "traditional" fishermen may be intellectually "ahead" of scientists for having felt the hunter's need to understand the behavior of prey-in-context but not the scholar's temptation to refine a typology beyond the point of diminishing marginal practical value. 1/ In short, experts who would educate fishermen to think eco-systemically about fish should be prepared to learn while teaching.

1/ Morril (1967) presents a Caribbean case that can be interpreted along these lines.

2. Economics

2.16 Marine biologists proposed MSY and grew aware of its limitations. More recently, fisheries economists have been moving through a similar experience with their own preferred aim of maximum economic yield (MEY).

2.17 Although they wrote in the vein of earlier work in resource economics (by Gray 1914 and Hotelling 1931), in relation to marine biology, H. S. Gordon (1954) and Anthony Scott (1955) were revisionists. Gordon proposed that the biologists' touchstone of MSY be replaced by MEY, which he defined as "the difference between total cost, on the one hand, and total receipts (or total value production), on the other"; fisheries management, after all, was meant to benefit man, not fish (Gordon 1954:124, 129). For him, the common property nature of the ocean was the crux of the problem of economic overfishing--in which MEY tends to equal zero as more and more fishermen enter the grounds. A decline in the catch per unit of effort might reflect not a decrease of fish but an increase of fishermen. Gordon opposed sharing the catch among more and more catchers, calling it the "dissipation" of return to the resource. Economic overfishing, because it was inefficient, was no more desirable than its biological equivalent. Although Gordon's stress on economically efficient fishing opposed him to biologists, he resembled them in that he too stressed the distinctive nature of marine resources, implicitly rejecting the possibility that fisheries development could be subsumed under rural development. In his own summary words, "the plight of fishermen and the inefficiency of fisheries production stems [sic] from the common property nature of the resources of the sea ..." (Gordon 1954:134).

2.18 Anthony Scott's early work was revisionist in a different way. Whereas Gordon proposed private ownership of the resource to protect it from the inefficient, overcrowded exploitation that its common property nature would otherwise dictate, Scott (1955) went further to recommend sole ownership. Sole owners, public or private, would be less likely than free agents with free access to discount tomorrow in favor of unrestrained, inefficient production today. And although he distinguished sole ownership from monopoly, the latter prospect did not disturb Scott. If competition between sole owners of different fisheries might still induce gradual resource depletion, a monopolist controlling all the fisheries and fish prices could most afford to maximize long-run net income and thus preserve the resource indefinitely.

2.19 At a time in neoclassical economics when free-market competition was widely agreed to further efficiency and thus progress, Scott's position was unusual. But then--so Scott would have argued, in concert with Gordon--so was the resource. And at issue was not the goal, which remained efficiency in the sense of least cost for most revenue, but merely how to achieve it.

2.20 By the 1960s, the case for MEY over MSY and for exclusive over common property had become orthodox among fisheries economists--e.g., Crutchfield and Zellner (1962)--and both themes were implied by the title of Christy and Scott's extremely influential collaboration in 1965: The Common Wealth in Ocean Fisheries: Some Problems of Growth and Economic Allocation.

This book also expanded the range of factors under consideration to include international fishery laws, treaties and commissions.

2.21 In a word, Christy and Scott argued restraint. The shift from MSY to MEY did not give fishery managers license to increase production. If the biologists who advocated MSY had called for a reduction of fishing effort (and therefore production) in the name of conservation, the economists who proposed MEY would reduce effort and output even more in the name of efficiency. 1/ The logic of the economic argument also pointed toward exclusionary control, for only a sole owner of the resource would find it rational to stop hiring additional fishermen once his profit had been maximized--that is, once MEY to him had been reached.

2.22 Concerned as they were to advance MEY over MSY--for despite their broad scope, they were still writing more against biologists than for social scientists--Scott and Christy treated the implications of restraint only in passing. In order to maximize economic yield, it might,

for example, be necessary to reduce the number of vessels and fishermen by a third or a half. In advocating policies that would require this, economists assume (a) that the gain to the industry would be great enough to compensate all those who lost and that such compensation would actually be paid, or (b) that compensation would not be necessary because society would swiftly and painlessly transfer those who lost to equally attractive jobs elsewhere. It is easy to see that these assumptions may not be fully realized in actual cases. In an economic sense, society may still be better off because of improved efficiency, but politically or socially, the imposition of such hardships, even of a transitional nature, may be difficult to bear.

Nevertheless, "if economic efficiency is to be considered a valid goal for management of fisheries"--the main ambition of their book--"then it can only be approached by restricting the number of producers." As to how this might be accomplished, Scott and Christy stopped short of expulsion, recommending instead the licensing and taxing of new entries into the fishery and a policy of not replacing exits that might occur through natural attrition--death, retirement or employment outside the fishery (Christy and Scott 1965:16, 222; cf. 11, n. 4).

2.23 The call for efficiency did not go long unanswered. Beginning with Daniel Bromley (1969), welfare economists opposed the neoclassical attitude as morally biased in its preferred policy goal (efficiency of production)

1/ According to Christy and Scott (1965:14), in the standard case, the point where MSY is reached "will never correspond to the point of maximum economic efficiency" because "the greatest net economic return [MEY] will always be at a point closer to the origin (where less effort is engaged)"

and empirically incomplete in its units of analysis (fishing firms, fishing grounds). For Bromley and Bishop (1977:287), "since there are an infinite number of efficient solutions all based upon a different distribution of rights and endowments, to talk of efficiency in public policy issues ... is without meaning in isolation from distribution." And historically, because neoclassical writers from Gordon onward had tended to accept factor prices as given, their case for efficiency implicitly endorsed the existing distribution of income. Even Pareto optimality was not inconsistent with a policy that would increase the inequality between rich and poor--especially if, following Crutchfield and Zellner's advice (1962:24), returns from fishing were to be distributed among producers on the basis of their contribution to production.

2.24 For Bromley (1976), the neoclassicists' "blind spot" regarding distributional questions was a consequence of their having pitched their analysis at the level of the firm, whose net yield was to be maximized, rather than at the higher level of society or the lower level of particular fishermen and their families, whose welfare might or might not be furthered by a firm's success in achieving MEY. Those who were to be retained or restricted out of the fishery were, after all, individual human beings, "not mere pounds of fertilizer, acre-feet of water or tons of bauxite. The appropriate maximum for public policy is aggregate social welfare. And this is not known until the distributional implications are known."

2.25 For Bromley, it was time to widen the scope of description and prescription in another way as well. When Scott had advocated sole ownership of the resource defined as a fishing ground, he had made an error of omission similar to that of the typical fisheries biologist whose MSY-targeted model had been limited to a single, valued species. Bromley (1969:36-37) preferred the ecologist's view of the ocean as "a vast, complex ecosystem." And since, therefore, "no ground or species can be managed or controlled in isolation, similarly, socially desirable fisheries management is not accomplished atomistically, but as a part of the larger ecosystem."

2.26 In short, and simplifying, for conservation-minded marine biologists in the 1950s, the crucial interface lay between fish caught and fish not caught, where the amount, weight and nature of the former would almost, but not quite, begin to threaten the harvestability of the latter, including the unborn among them. By the 1960s, efficiency-minded resource economists had begun to shift the interface to another ideal point, located this time between people (the firm) and fish (the fishing ground), and to redefine optimality as the maximum difference between the firm's total costs and

revenues. 1/ By the 1970s, distribution-conscious welfare economists were arguing hard for a third interface: between people and people.

2.27 As previously discussed, biology's two major contributions to artisanal fisheries development in poor countries were, first, to formulate MSY, and later, to encourage a revised and broadened view of fisheries as ecosystems. Following suit, economists first pinpointed MEY and then tried constructively to revise that idea to take into account more variables. Both of the latter insights, the conceptual and the contextual, bear evaluating in the light of the needs of developing countries.

2.28 Applied to artisanal fisheries serving protein-deficient populations, MEY was in some ways a step backward from MSY. First, for most stocks, it required fishermen to abstain from catching not only those extra fish whose premature death would endanger the viability of the stock but, in addition, any extra fish whose capture would reduce the difference in value of total production over total costs. In this way, neoclassical economics moved fisheries science even farther away from the nutritional needs of consumers. Not until the 1970s would economists seriously face the problem of how to distribute catch value, measured in protein or money. Second, in a country whose labor force was growing much faster than it could be employed, how economically (let alone ethically) appropriate was the criterion of efficiency to begin with? In a dual economy, would the goal of efficiency help policymakers to take existing terms of trade for granted, and thus favor the already favored commercial sector?

2.29 Third, although they meant to expand the scope of analysis, MEY-advocating economists in a sense narrowed it by pointing to a single cause--the common property nature of marine resources--as responsible not only for biological and economic overfishing but even for the prevalence of poverty among fishermen. (See, for example, Gordon 1954:131-135.) Yet if poverty among those who work a given resource results from the nature of that resource, why are landless agricultural laborers not noticeably better off than their "sealess" counterparts? And if the comparison is instead between a wealthy farmer who owns a piece of land and a poor fisherman who owns no piece of the sea, how much of the former's success is attributable to the "ownability" of his resource and how much to the size and fertility of his holding, to his access to credit and markets, to his ability to store his

1/ Such a neatly chronological distinction between conservation-minded marine biologists and efficiency-stressing resource economists is necessarily overdrawn. Among biologists, consider the prescient remark of Graham back in 1935 (:264), for whom "the peculiar attraction of the modern theory" was its lesson "that the benefit of efficient exploitation lies more in economy of effort than in increase of yield, or preservation of future stocks, though both of these purposes may also be served." As for the resource economists, since by their guiding light--MEY--catch equations aimed at MSY appeared, other things being equal, too generous, they ended up advocating even more stringent conservation (as noted below).

product until prices rise or even to his skill in influencing people? Does Scott's hierarchy of rising benefits to physically and economically competing hunters, to economically competing sole owners and to a noncompeting monopolist illustrate the disadvantage of open access intrinsic to the sea or that of powerlessness to control the use of any resource, oceanic or not, which characterizes people trapped in poverty?

2.30 The other side of the coin of overreliance on common property theory was overoptimism about sole ownership. The economic attitudes and actions of a sole owner are not so wholly a function of his legal responsibility that they can be predicted from it. Strictly within a neoclassical frame, holding all else constant, if competition punishes inefficiency, sole ownership should encourage it. A government that owns a fishery might decide to use it not to generate net revenue but to accommodate the unemployed, running the resource inefficiently for maximum social welfare. To infer MEY from proprietorship, that is, to predict specific use from mere possession, is unrealistic. Who will control the controller? If the stock is economically valuable but reproduces slowly, a sole corporate owner might prefer to exterminate it in the name of profit (Clark 1974), in which case MEY would not even be conservationally superior to MSY. 1/

2.31 In other ways, however, MEY proved heuristically valuable to fishery personnel in lower-income countries. By crystallizing an alternative to MSY, MEY expanded the range of policy choice. By incorporating input cost and output price into the biologists' equations of effort and catch, the new concept helped make policy thinking more realistic. Less obviously, the use of MEY by writers like Christy and Scott to advise reducing effort and limiting entry raised for serious consideration the rarely imagined possibility that, in the long run, the best thing a government could do for many of its artisanal fishermen might be to help them, or at least their children, to escape that profession altogether.

2.32 In global perspective, the biological rationale for dismantling an overcrowded traditional fishery was not strong. "The most spectacular and threatening developments of today ... can by no means be attributed to impoverished local fishermen. On the contrary," noted Clark (1974 [1977:87]), "it is the large, high-powered ships and the factory fleets of the wealthiest nations that are now the real danger." But the economic rationale for not using an overexploited artisanal fishery as a catchment area for surplus

1/ For these reasons, this recent "epitaph" for MSY (Larkin 1977:10) appears premature: "Here lies the concept, MSY. / It advocated yields too high [or did it?], / And didn't spell out how to slice the pie [neither did MEY]. / We bury it with the best of wishes, / Especially on behalf of fishes. / We don't know yet what will take its place, / But hope it's as good for the human race." Material in brackets added. According to Gulland (1978:4), the useful simplicity of MSY is grounds to expect that it will prove hard to replace and that those who, like Larkin, sent it riding off "into the sunset" may in future see "son of MSY" galloping back to the rescue.

agricultural labor enriched the debate among fishery administrators by making them more aware of the long-run opportunity costs of short-term social welfare. Already implicit in neoclassical writings, this prescription for greater sensitivity to more variables was made explicit, ironically, by welfare economists who attacked their predecessors' economic criteria as asocial. By the late 1970s, this literature could even be used to justify rethinking fisheries development as an instance of "integrated rural development." 1/

2.33 Among scholars, these inclusionary trends continue to yield more complex and finely tuned models. The new science of "mathematical bio-economics" (Clark 1976), for example, is an elegant theoretical blend of three disciplines. But, as already noted, such refined software does not fit the need of many developing-country governments for an "intermediate methodology" to help them set and seek development goals that are broadly context-sensitive without being vaguely "all things to all people." More promising in this regard is the proposal by Western academics and decision makers, building on MSY and MEY, to make optimum sustainable yield (OSY) the new benchmark of aquatic resource management. 2/

2.34 As defined by one of its proponents (Roedel 1975:85), OSY is "a deliberate melding of biological, economic, social, and political values designed to produce the maximum benefit to society from stocks that are sought for human use, taking into account the effect of harvesting on dependent or associated species." Alternatively, to reflect the preceding argument that policy cannot be improved without first improving the ways policy is made, OSY could be defined as that sustainable yield whose weight, net value and disposition are optimal in that they meet a set of policy objectives (ranked operational goals) in whose design possibly incompatible biological, ecological, economic, social and political considerations, including the interests of local and larger communities, have been taken into account.

1/ On the other hand, in many Asian and Pacific fisheries, these writings have been unavailable or ignored. And even if a local academic knows this literature, he or she may understandably prefer to couch advice neither in economic nor sociological terms but to meet the political concerns of those who rule. A possible case in point is the argument by a North Sumatran economist (Darus 1979:55-56) for supporting local artisanal fishermen lest they become involved in physical conflicts with their advantaged commercial counterparts or be driven by the latter inland, where new clashes could occur, and to keep coastlines inhabited to facilitate surveillance for national defense and against contraband.

2/ These neologisms are not so recent as they sound. Baranov (1918) coined the term "bionomics" to describe his own work, although in fact he slighted economic variables, and "optimum sustainable yield" dates back at least to the UN-sponsored Fisheries Convention of 1958 (Roedel 1975: 82).

2.35 A brief recapitulation of MSY and MEY may help in appraising the relative value of OSY as a guideline for developing countries. Sighted on the highest output by weight available just under the threshold of biological overfishing, MSY favored conservation-guided production. Aimed at the greatest output by value per input by value, a point located just below the threshold of economic overfishing, MEY favored efficiency-minded production. For most stocks, if MSY placed an upper limit on physical output, MEY lowered that limit while limiting input (capital and labor) as well; users of MEY were asked to be doubly abstemious. For some (highly valued, slowly reproducing) stocks, however, efficiency might make virtual extinction rational. Nor did MEY accommodate distributive goals in the sense of preferred ultimate destinations for output in units of nutrition, employment, or income. On the other hand, MEY was more contextual than MSY in directing attention to the opportunity costs of allocating factor inputs to fishing rather than some other activity.

2.36 This is not to say that MSY or MEY could not be used to achieve better nutrition, more employment, or higher incomes (see Table 1). A maximum sustainable yield could be channeled to rural dwellers to improve their health or processed in employment-creating ways to boost local incomes, just as a maximum economic yield could be reinvested to the same ends. In that case, however, MSY and MEY would have to be seen not as goals but as means. MSY and MEY are too readily made ends in themselves--as if taking a particular yield, in kind or in money, were enough.

2.37 For policymakers in developing countries, this could be the chief merit of using an optimum rather than a maximum. In societies where large portions of people are in extreme need, and where those with the greatest needs are among the least productive--that is, where free-market forces may only reinforce absolute poverty and structural inequality in the name of economic efficiency, OSY can help decision makers to examine what, how important and how compatible their aims, including distributive justice, really are. MSY and MEY, because they are precise, risk being used as surrogates for broader policy objectives. A goal such as "optimum biosocioeconomic benefit," because it is imprecise, does not promote specification and choice any more than a policy is made any better by labeling it "good" in advance. But OSY, anchored in an objective criterion (whatever the yield, it must be sustainable) 1/, raises in an open-ended way the need to specify subjective

1/ That this condition "tilts" OSY slightly toward MSY and away from MEY is not undesirable if (as previously argued) MSY is more likely than MEY to suit the conditions typically present in a developing country. Nor need "sustainable" mean absolutely unchanging. Should famine or depression temporarily skyrocket the premium on food or jobs, yields could be raised above MSY "with the understanding that overdrafts from the biological bank [would] have to be repaid or the fishery lost" (Roedel 1975:86). Conversely, if such needs were less urgent, a government whose nationals were not yet able, technologically or infrastructurally, to take full advantage of a fishery could decide to keep catches below MSY in hopes of a sharp increase in production later to help cover the high initial cost of acquiring that capacity.

criteria that are not mere physical or monetary characteristics (maxima) of that yield but which also address the question of its (optimal) disposition.

2.38 Although OSY is still far too rarely used to be evaluated in practice, recent American experience in codifying and applying the concept bears brief review. As defined by the U.S. Congress in the Fishery Conservation and Management Act of 1976, the "optimum" in OSY "means the amount of fish (a) which will provide the greatest overall benefit to the nation, with particular reference to food production and recreational opportunities; and (b) which is prescribed as such on the basis of the maximum sustainable yield from such fishery, as modified by any relevant economic, social, or ecological factor" (United States 1976: sec. 3, art. 18). The act further established a set of regional councils and mandated them to prepare fishery management plans for their respective areas after conducting hearings to allow "all interested persons an opportunity to be heard" (sec. 302, art. h). According to the act, measures to implement those plans would help "prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery"; would, "where practicable, promote efficiency in the utilization of fishery resources, "except that no such measure could have "economic allocation as its sole purpose"; and, in the event that a limited number of fishing privileges had to be distributed among American fishermen, would not allow any individual or corporation "an excessive share of such privileges" (sec. 301, art. a).

2.39 About this model, policymakers in developing countries might ask the following questions: Is it enough to define the nation as the beneficiary, or should clienteles beneath and beyond the national level also be included? Within the nation, how should the fish eater's interest in a low consumer price be balanced against the fish catcher's interest in a high producer price? If fishing privileges are to be allocated equitably, what constitutes "an excessive share"? Should "excessive" be interpreted to imply an absolute or proportional weight or value in fish more than which no one should be privileged to catch (mathematical equality), or to mean an extreme degree of access to the resource that should not be granted to anyone either too overendowed to need the privilege or, on the contrary, too underendowed to use it productively (functional equality)? Internationally, should regional marine resource management (e.g., by the Association of Southeast Asian Nations, whose members are all coastal states) be favored over bilateral and directly export-promoting relations with industrial nations (e.g., America and Japan)?

2.40 Are "recreational opportunities" for foreign and domestic tourists an appropriate use of marine resources in a largely undernourished, low-income society? Does the answer depend in part on how tourism is managed and what the resulting net revenue is used for? Is the concept of OSY as a conscious deviation from MSY appropriate, or would the notion of opportunity cost implied by MEY make a better baseline for a government concerned mainly to use scarce resources efficiently? And if so, how appropriate is the American provision that no fisheries development policy be aimed solely at efficient "economic allocation"?

2.41 Perhaps the most important and original innovation of the 1976 fisheries management act was to call for decentralized and participant planning, by regional councils whose members' ears would be open to "all interested persons." This feature of the act raises for developing countries the question posed early in this paper: Should the main task of fisheries development be defined as community assistance or resource management?

2.42 For those in developing countries who would involve affected groups in decision making, the way the American act has worked out in practice is instructive. An observer of the meetings convened by the New England regional council found that fishermen tended to emphasize hardware proposals such as banning certain gear or prescribing minimum net mesh size (through which juveniles could escape), while businessmen, administrators and scientists offered software solutions such as systems modeling and schemes to stimulate or dampen demand. This finding underscores the point made earlier that fishery development is a two-way learning process requiring considerable empathy.

2.43 At one of the New England meetings, after a series of heated and wide-ranging remarks by several fishermen, an industry representative was heard to say, "They just don't understand! We don't even talk the same language!" (Smith 1978:51-52). In a developing country, where differences of language, religion, wealth and education are likely to be more marked and reinforcing than they are in America, it is even more important to avoid such misunderstandings lest developers and their clients end up thwarting each other. (For an Asian illustration, see Emmerson 1975.)

2.44 Also conspicuous by their absence from the New England council meetings were onshore laborers (e.g., dock and cannery workers) and persons identifying themselves as consumers (Smith 1978:55). This finding suggests that a special effort may have to be made to represent the interests of inland consumers and onshore workers in the process of making policy. In many developing countries in Asia and the Pacific, for example, little or no attention has been paid to the needs of fish porters, and consumers have been thought too amorphous a constituency to represent except by implication or abstraction. Nor does it seem coincidental that these particular groups should be underrepresented in the policy process, for compared to businessmen, scientists and officials interested to varying degrees in production and conservation, protein-short consumers and income-short laborers are likely to have mainly distributive concerns. Its potential for helping to make distribution more visible, and thus for helping to broaden horizons and flesh out agendas, could prove a major merit of OSY as a policy-formulating device.

3. Law

2.45 OSY is not only a product of biology and economics. In the United States, Congress legislated OSY not on bioeconomic grounds alone but because it had to make rules for managing the 200-mile zone of exclusive jurisdiction whose unilateral establishment was the main purpose of the 1976 act. As summarized and compared with other disciplines in Table 2, legal thinking about fisheries development has the oldest antecedents of all.

2.46 The idea of common property so basic to the bioeconomic case for marine resource management was originally a point of international law. The intellectual ancestor of Gordon (1954) was Grotius (1609), with the difference that whereas the Canadian economist deplored the consequences of open access, the Dutch lawyer defended them. And whereas the notion of sole ownership advanced by Scott (1955) and the case for licensing made by Christy and Scott (1965) seem modern, it was also in 1609 that James I of England proclaimed that any foreigner wishing to fish off any coast or in any sea of the British Isles would have to obtain, annually, a royal license to do so, or risk painful "chastisement" (James I 1609).

2.47 Grotius' famous pamphlet, Mare Liberum (lit., The Free Sea) defended open access on the grounds, first, that the sea "cannot be occupied" and thus "cannot be the property of anyone, because all property has arisen from occupation," and that it "has been so constituted by nature that although serving some one person it still suffices for the common use of all other persons"--as in fishing and navigation (Grotius 1609: ch. 5). In England, this Dutch reasoning flew in the face of the exclusionary policy of James I, which itself had been aimed against Holland's vast and active herring fleet, and Grotius' ideas became widely known and debated. A quarter-century later, in 1635, major statements of policy and principle again coincided when the English king, Charles I, forbade anew any foreigners from fishing in "his" seas without a license, and an English scholar, John Selden, backed up the royal pretension with anti-Dutch principles in Mare Clausum (lit., The Closed Sea).

2.48 Less well known than Grotius' views, Selden's seem the more realistic today--notwithstanding the Englishman's extravagant case for a British maritime empire incorporating all of the North Sea and a generous portion of the Atlantic. To the argument that the sea is innately incapable of appropriation, Selden replied by generalizing from the inland example of rivers and springs, which under Roman law could become private property. He pointed out that some seas are entirely enclosed by land (the Caspian) or nearly so (the Mediterranean) and that even on the high seas boundaries may be determined by islands or rocks or, lacking these, by degrees of latitude and longitude. As for the ocean's innate capacity to satisfy all its users, Selden argued on the contrary that the sea's abundance is reduced by fishing, just as metals in the soil are diminished by mining, such that "less profits ariseth" from further exploitation of its resources (Selden 1635: book 1, ch. 22). And for these among other reasons, Selden upheld the right of English kings to license foreigners fishing in "English" waters (book 2, ch. 21).

2.49 Because both Grotius and Selden's universal principles were advanced on behalf of trading and fishing interests in their respective countries, they may be considered, as in Table 2, examples of mercantile law. In subsequent centuries, the Grotian doctrine of freedom of the seas, though not always observed in practice, became orthodox in theory. Even England,

becoming the world's mightiest oceanic power, abandoned Mare Clausum for Mare Liberum. 1/

2.50 It is against this orthodoxy that two major postwar works on ocean law, McDougal and Burke (1962) and Johnston (1965), appear neoclassical. Both books are in the "open access" tradition. But whereas the literature since Grotius and Selden had become rather narrowly jurisprudential, debating the applicability to the seas of the notion of "territorial sovereignty" from the standpoint of various legal precedents, McDougal and Burke launched a broader, more cross-disciplinary vision of ocean law, including fisheries law, as a changing product of, and response to, an array of biological, technological, economic, social and political factors.

2.51 Johnston, a student of McDougal's, saw the subject through his teacher's wide-angle lens. But their approaches differed. For McDougal and Burke (1962:489), the major criterion guiding fisheries policy was properly economic: to make production more efficient. Globally, this goal required scientific exploitation unimpeded by extravagant national claims to marine sovereignty. Locally, MEY dictated that fewer fishermen take fewer fish to the greater economic benefit of "all participants"--that is, those retained--in the fishery (:482).

2.52 In contrast, for Johnston (1965:146-147), the fecundity and fragility of the biomass obliged fishery policy to make, above all, "biological sense." In adjudicating competing claims to a fishery, a host of secondary considerations would arise; Johnston's list included each claimant nation's standard of living, income distribution and eating habits, and each fishing community's psychosocial makeup, dependence on government, and relationships to other communities. But true rationality and neutrality meant "invoking primary criteria which are related to the resource rather than to the users."

2.53 This difference aligns these two works alongside their neoclassical counterparts in other disciplines, with Johnston's echoing the concern in biology for the viability of the resource and McDougal and Burke's repeating the primacy in economics of the profitability of the resource. Analogously, in the 1970s, the time was ripe for a student of "welfare law" to attempt what Bromley had tried in economics: to shift priorities still farther outward to include Johnston's "secondary" variables--especially those touching distributive justice--among the primary criteria for public decision.

2.54 The distributive issue turned out, however, to be raised not by social scientists in scholarly journals reviewing the law of the sea but

1/ It is no coincidence that in the early 17th century the "closed sea"-advocating English were a weak fishing power seeking to protect their offshore resources from the Dutch herring fleet, just as the latter's large numbers and nautical reach supported an "open sea" position, or just as, today, statements by the less developed maritime nations appear Seldenesque (see below) while industrial countries with global fishing fleets can afford to be Grotian.

by government officials in international organizations trying to remake it. Common property resource theorists in the 1950s and 60s had waged their campaign against overfishing--biological and economic--under the slogan, as Scott put it in 1955, "Everybody's property is nobody's property." By the mid-1970s, the issue was no longer whether oceanic resources should become someone's property but whose they should become and for whose benefit and loss. 1/ That politicians have dominated this latest phase of the debate reflects the intense controversy surrounding the distributive issue itself. 2/

2.55 Specifically, early in the decade, two events aroused widespread interest in two different approaches to the ownership of ocean resources. In 1970, at the insistence of the Third World, the United Nations General Assembly declared that resources on and beneath the ocean floor beyond the limits of national jurisdiction were "the common heritage of mankind," not subject to appropriation by anyone, and to be used "exclusively for peaceful purposes" and "for the benefit of mankind as a whole" (Lee 1975:11, citing the resolution). However impracticable this idea turns out to be, it has enhanced the debate over marine resource use by raising the possibility of an international agency not only regulating but managing oceanic exploitation in such a way that some significant portion of the economic return from sea and seabed resources will accrue to nations technologically least able to participate in exploiting them--in humanitarian violation, as it were, of a purely productivity-based reward schedule. Passage of the "common heritage" resolution suggests that a metaproblem may finally be generating the metaconsciousness necessary to solve it. 3/

1/ This shift in perception is not only attributable to academics and policymakers. Fishermen themselves have learned, from direct experience of overexploitation, the need for restraint and for the hard distributive choices restraint necessitates. Reported examples include lobstermen in Maine (Wilson 1977:109-110) and oystermen in England (Cove 1973: 258-259).

2/ It may also reflect the unwillingness of some scientists to speak out on the issue. At the Second Annual Conference of the Law of the Sea Institute in 1967, for example, one fisheries expert argued flatly that "any attempt to relate specific shares of a managed fishery with scientific findings, economic factors, or any other objective criteria is sheer chicanery" (Crutchfield 1968:27). Or, as Scott put it (1977:410), if "economists had to forget something to pursue what they are good at, distribution would be the first responsibility of which they should be relieved."

3/ As Boulding (1977:289) has phrased it, "A great problem of the human race at the present moment is that the world is becoming a single ecosystem, but is not a single community." Whether the idea of a shared "common heritage" heralds an eventual end to this anomaly remains, of course, to be seen. Among the optimists is Hargrove (1973:11).

2.56 The other event, which also occurred in an organ of the UN, was the support given in 1971 by Ambassador Pardo, the Maltese delegate, to the idea of a 200-mile economic zone for coastal nations. Although 200-mile fishery claims had been made before, notably by a number of Latin American countries after World War II (Pabst 1976:89), Pardo's widely publicized proposal dramatized and partly legitimated the prospect of drastically extended fisheries jurisdiction in the context of an impending general reappraisal of the law of the sea (Kusumaatmadja 1975:199). Beginning in 1974, the Third United Nations Conference on the Law of the Sea (LOS-III) helped make extended jurisdiction a central issue for debate.

2.57 In the wake of Pardo's call and the discussion that ensued, states as diverse as Bangladesh, Iceland, and, as previously noted, the United States unilaterally extended their fishing limits to 200 miles. If "common heritage" reasoning held some hope for the transnationalist management of open sea resources, old-fashioned nationalism flourished closer to shore. And unlike the vague idea of sharing an inheritance for the benefit of mankind, the case for extended jurisdiction seemed to vindicate the neoclassical view. Hadn't Christy recommended "sole ownership" of the resource?

2.58 On behalf of their nations' maritime claims, politicians also used the same multivariate view toward which biology and economics had been trending. Peru argued that in "its" ecosystem a complex set of vital relationships between fishermen, water, plankton, fish, birds, guano and farmers so thoroughly crisscrossed the shoreline as to obliterate its meaning as a legal boundary (Goldie 1975:70-71). Indonesia advanced the archipelagic principle of sovereignty over "its" interinsular seas as mere de jure recognition of the existing bioeconomic interdependence of land and water (Kusumaatmadja 1973:173-174).

2.59 The arguments of Third World spokesmen were situational in another respect as well. "Freedom of the seas" was an abstract principle that ignored the unequal fishing abilities of different countries. "Naturally only the big powers with their superior maritime capability and advanced technology" could take advantage of the right of open access, remarked the representative of the People's Republic of China at a meeting to prepare LOS-III-- powers like the Soviet Union, whose huge factory ships could catch and process fish entirely at sea (Shen 1973:3). "All the natural resources in the world are useless," noted Sri Lanka's spokesman at another conference on maritime law, "without the technology" to exploit them. "Dismayed by the widening gap of technological competence," he continued,

the developing countries are determined to safeguard their hard-won rights to a portion of the world's wealth. If they cannot benefit from their share now, then they want to save it until they possess the technological capacity to do so. They do not want to lose their inheritance in the meantime to those who have the means to harvest these riches immediately. They do not see the need for it to go toward the maintenance of standards of living in other parts of the world which far exceed their own [Pinto 1973:13].

2.60 By 1975, Christy could say to fellow delegates gathered to review the progress of LOS-III, "We are really in the process of dismantling the principle of freedom of the seas." 1/ By the decade's end, at the risk of oversimplifying, one could say that Grotius had finally been defeated by an unlikely coalition of bioeconomists from the First World and Seldenesque politicians in the Third. 2/

2.61 But the departure of laissez faire did not imply an arriving consensus on what ends marine resource management should serve. In the 1970s, legal writers in the First, Second, and Third Worlds appeared mainly to favor, respectively, conservation, production and redistribution. When American scholars asked, Who protects the ocean? (Hargrove, ed. 1975), they hoped to publicize and prevent the "tragedy of the commons" (Hardin 1968) that haunts most First World conservationists. A Polish observer acquainted with marine resource policymakers in the Second World (specifically, Eastern Europe and the USSR) described them as intensely productionist in believing that "further development of marine fisheries cannot be halted by a scarcity of living marine organisms," for as upper trophic levels are emptied, one need only shift fishing effort to underexploited lower ones; that "it makes economic sense to introduce new technology at all fishing and processing levels" in order to reap economies of scale; and that "maximum volume of catch [MSY] is the most important objective of socialist fisheries" (Kaczynski 1977:401-405). As has already been shown, in the eyes of Third World spokesmen like Pinto (1973) and Kusumaatmadja (1973), "Northern" arguments for conservation and production appeared merely to reinforce anti-"Southern" bias in the distribution of access to oceanic resources. In sum, while extended jurisdiction, by giving legal arguments greater scope, has intensified the need for nations to decide what to prescribe and proscribe within their new boundaries, neither writings nor meetings on maritime law have yet met this need with a new consensus.

1/ Christy 1975:115. Later, in the spirit of Larkin's previously quoted "epitaph" for MSY, Christy penned an "Ode to the Grotian Ocean" that included these lines: "The maritime powers / Have long had their hours / In using the ocean for free. / Now the 77 [the Third World "Group of 77," which became much larger] / Are in 7th heaven / Repealing the law of the sea. / And Selden is seen / As fully redeemed, / With [ocean-bed mineral] nodules increasing the stakes. / Dear Grotius, my gracious: / The oceans aren't spacious. / They're nothing but coastal states' lakes" (Christy, personal communication, 25 August 1978).

2/ An account broader in geographic scope than this paper would discuss the roles of First and Second World politicians too. The extended jurisdictional claims made by west-coast Latin American nations in the late 1940s, for example, were in part a demonstration effect of President Truman's decision at the end of World War II to create fishery zones off American coasts (Goldie 1975:88-89).

2.62 What effects will sea law reform have on artisanal fishery development in lower-income countries? Extended jurisdiction creates a potential barrier to foreign competition not unlike that posed by a tariff wall around an infant industry. A protected traditional fishery may become more inefficient, and its inefficiency may become entrenched by mechanization over a wider hunting surface. If foreign competitors for scarce fish previously exerted pressure on local fishermen to take up other occupations, "200 mile" nationalism may reduce this disincentive and prolong uneconomic operations. Alternatively, if foreign vessels are allowed to continue working a nation's marine margin for a fee or a percentage of the catch, smaller-scale indigenous fishermen may feel discriminated against, especially if their access is progressively closed off by competition or regulation.

2.63 In any of these events, the need for extended surveillance will proportionally strengthen naval budgets, as will the overtones of national security that extended jurisdiction tends to carry. In consequence, marine resource management, including artisanal fishery development, will be complicated and politicized by the involvement of more agencies and groups with differing if not clashing intentions. At the same time, because the new limits will add a rim to the national pie to be shared by a typically large, growing and resource-hungry population, extended jurisdiction will make distributive questions--who should get how much, on what terms, for what purpose and why--imperative, thereby rendering earlier hopes of achieving an ideal, static and permanent bipolar balance between conservation and production naive. Nor are these trends surprising, for they parallel the shifts already emphasized for other disciplines toward greater awareness of variables other than the mere weight or value of fish caught in relation to fish remaining or investment made.

4. Anthropology

2.64 To decision makers in poor countries, the fourth and final literature sampled in Table 2, in anthropology, has much to offer. Methodologically, it shows how much can be gained by approaching artisanal fishermen empathically and by appreciating their community holistically and in ethnographic detail. Substantively, it shows how important are the social norms of sharing and exchange that typically govern the distribution of the catch in a subsistence fishery, and how rapidly those norms deteriorate when the fishery is mechanized and commercialized. A review of three classic monographs in economic anthropology--case studies of Melanesians, Polynesians and Malays--will illustrate these points while helping to anchor the rest of this paper in Asian and Pacific evidence.

2.65 Melanesians and Polynesians. Economic anthropology grew out of a polemic over the goodness of fit between the axioms of Western economics and the behavior of what were then called "primitive" people. The polemicist was Malinowski and the proof Melanesian. According to Malinowski (1922:60, 516), the case of New Guinea's Trobriand Islanders disproved the theory that man was a self-interested economic animal motivated "in all his actions" by, and always moving "in a straight line" toward, material goals. For the Trobrianders spent their time not trying to satisfy material wants, beyond

the necessary minimum, but pursuing social status through a complex set of political and kinship obligations to donate and receive gifts.

2.66 These Melanesians were not innately altruistic or communistic. Like all human beings, according to Malinowski, they wanted to acquire useful things and feared material loss. But a strong social norm favoring ritual exchange over possession overrode the islanders' acquisitiveness. The value of a gift lay not in its economic capacity to improve a recipient's welfare but in its social aspect as the symbol of a relationship linking donor and recipient to each other and, through prior and further exchanges, to other islanders. This norm found fullest expression in the elaborate pattern of the kula, in which red shell necklaces moved clockwise around the islands in return for white shell armbands moving counterclockwise, for these items had no material use, could be traded in the Trobriands only for each other, and were rarely even worn by those who temporarily possessed them (Malinowski 1922: 81-104, 167).

2.67 Among fishery goals, if production and conservation flow from decisions surrounding the act of capture, the heart of distribution is exchange. Compared to its place in the evolution of biology, economics and law, distribution was a far earlier concern of anthropologists, who both stressed its importance in shaping community life and argued against picturing it in overly material terms. In this double criticism of "unanthropological" economics, economic anthropology quickly found a reason for being.

2.68 Malinowski, for example, used the Trobrianders to attack the idea that the behavior of people in a "primitive" society would be more determined by naked economic need, less richly clothed in social obligation, than that of their "civilized" counterparts in the industrial West. "Primitive" is not necessarily "poor," however; the ratio of people to resources in Trobriand society at that time was apparently quite favorable. How much of the islanders' willingness to engage in social transactions could be attributed to their environment's insulating them from preoccupation with material satisfactions and exchanges? The lesson for the developer is not to assume the primacy of material or any other motivation, but to learn through intimate observation, as an anthropologist would, what values govern which kinds of exchanges and why, keeping in mind differences in the availability of relevant resources.

2.69 Consider Trobriand fishing. Malinowski (1918) found, first, that although fish were generally plentiful, catches were distributed according to detailed rules. Fishermen, chiefs, and the fishermen's close kin, in-laws and friends were entitled to specified shares. Neither these Melanesians, nor any other fishermen, Pacific or Atlantic, artisanal or industrial, about whom evidence was gathered in writing this paper, left the sharing of fish captured jointly by more than one fisherman up to the individuals involved. A particular community might lack rules governing production and conservation, or those that existed might be widely ignored, but every community appeared to have and obey rules governing the distribution of a catch, by weight or realized value, among those directly or indirectly responsible for taking it from the sea. A fisheries developer wishing to draw up regulations

to improve production or conservation would be well advised to relate these to the one kind of goal considered important enough locally never to be left to chance.

2.70 Second, although Malinowski did not draw this inference explicitly himself, the larger, more capitalized catches of relatively abundant prey to be expected from lagoon fishing tended to be shared less equally among participants than the more labor-using catches of relatively scarce quarry typical of reef fishing. In the lagoon, the owner of the boat received the largest share, but on the reef, where no boat was used, all who helped to herd the fish into the net, including the net's owner, received equal portions. To generalize: If distribution in a traditional fishery marked by scarce fish and surplus labor is likely to be fairly equal, can (should?) development, by increasing catch size through mechanization, avoid skewing the shareout to the benefit of capital? Will such skew cause previously egalitarian norms to deteriorate? If so, with what consequences and implications for development policy and the future of the community?

2.71 Third, Malinowski (1918:92) was struck by the diversity of meanings that the Trobrianders attached to different kinds of fishing, ranging "from a purely economic pursuit to almost a magico-religious ceremony," and noticed that these meanings were associated with danger and uncertainty. Safest and surest to yield a catch was lagoon fishing. At the opposite extreme lay shark fishing on the open sea. Lagoon fishing was utterly secular. But elaborate magical procedures, including community-wide taboos, surrounded the shark season. Generalizing freely again, from a single finding, the more risk-ridden the kind of fishing that developers decide to encourage, the more carefully they should consider its noneconomic meaning to participants. In the long run, technological improvements may secularize once-dangerous fishing by making it safer. But the greater likelihood of a mishap in the early but crucial demonstration phase of a project to assist high-risk fishing, and the consequent danger that magical beliefs will be reinforced at the expense of the project's legitimacy, argues for an inventory of the local meanings of different modes of fishing followed by an estimation of the chance of misunderstanding in the event a given mode is treated by developers in purely economic terms.

2.72 The results of Raymond Firth's later study of another Pacific island population, the Polynesian Tikopia, proved congruent with Malinowski's findings. Like their Melanesian counterparts, Tikopians surrounded riskier forms of fishing with ritual (Firth 1939:359-360), and their society too demonstrated the importance, and suggested the vulnerability, of social norms.

2.73 Less polemical than Malinowski and more sophisticated about economics, Firth realized that economic theory did not require that people, "primitive" or not, pursue only material ends but merely that they use scarce means to attain alternative ends of any kind, and that rationality therefore lay not in the nature of a goal but in the effectiveness and efficiency of its achievement. In this instrumental sense, Tikopian behavior was as rational and amenable to economic analysis as that of Englishmen.

As for Tikopian goals, these were, like the Trobrianders', essentially social and distributive--"as it would be in our society if people bought clothing, groceries, and tools in large amounts, and sold them again or gave them away not simply for their utility as consumer's goods, but for the satisfaction of maintaining social relations with the persons from whom they got them and to whom they handed them on" (Firth 1939:358).

2.74 As in the Trobriands, fish caught by the Tikopia were divided up according to clear rules, and the smaller the catch, the more equally it was shared. In the extreme case of a boat that returned with only one or two fish, the successful fisherman had to turn over to his crewmates all of his meager catch. Firth's informants openly acknowledged this custom as "the blocking of jealousy" (:282), a phrase that reveals the instrumental rationality of the share system. Given the importance of good relations among fishermen required to work interdependently in small space afloat, a positive association between scarcity and equality makes obvious sense.

2.75 Firth's Polynesian example also illustrates the relative unobtrusiveness of physical capital and the importance of social status in an artisanal fishery supplying local needs. Over all forms of Tikopian group fishing, the distribution of the catch was quite equal. Even the owner of the major piece of equipment used (a canoe or a net) could only expect to receive a share equal to that of an ordinary worker (a crew member or a fish drive participant). But if capital was not, in general, disproportionately rewarded over labor, within the category of labor, if the catch were reasonably ample, higher-status fishermen and kinsmen were allowed to take slightly larger or better-quality shares. This finding reasserts the advisability of studying the share system to estimate how it will be changed if development raises the contribution of capital to production. Aside from making share-outs less equal, the introduction of new technology may take a previous advantage away from local elites and thus undermine the stability of the community. And if crews are recruited without regard to kinship, the benefit of blood may also be lost, to the detriment of incentives to produce.

2.76 The variables of one discipline are the givens of another. Economists tend to take human nature for granted or treat it as a constant. Witness the common property theorists' image of fishermen as selfish, acquisitive, adventurous, and therefore willing to go to sea more and more often to obtain proportionally less and less. For Gordon (1954:132), for example, although the underlying cause of poverty among fishermen was the lack of private ownership of the resource, two characteristics locked them even more deeply into the tragedy of the commons:

The first is the great immobility of fishermen. Living often in isolated communities, with little knowledge of conditions or opportunities elsewhere; educationally and often romantically tied to the sea; and lacking the savings necessary to provide a "stake," the fisherman is one of the least mobile of occupational groups. But, second, there is in the spirit of every fisherman the hope of the "lucky catch." As those who know

fishermen well have often testified [ref. Graham 1943:86], they are gamblers and incurably optimistic. As a consequence, they will work for less than the going wage.

2.77 Each of these variables warrants brief comment in the light of the anthropological research just reviewed. If any fishing communities could be said to be cut off from the outside world, Malinowski's and Firth's remote Pacific field sites should qualify, confirming Gordon's image of isolated fishermen. On the contrary: in the 1930s, not long after Firth left the Tikopia, Christianity arrived, and one of the first things missionaries did was to secularize shark hunting. Even in the 1910s, when Malinowski worked in the Trobriands, his informants were not entirely isolated from the West. By the time he reached the islands, steel fishhooks had already completely replaced the traditional tortoise shell variety (1918:88-89), while not far to the west, along the Gulf of Papua near Port Moresby, armllets made from shells were being sold for 30 English pounds apiece (1922:28, 86).

2.78 As for fishermen having a gambling spirit, Graham's original point was situational: that the typical practice of paying producers a share of the catch instead of a fixed wage fed their hopes for a windfall. The share system, noted Graham, also benefited owners by keeping production up and provided fishermen with the satisfaction of working (albeit fractionally) for themselves. Yet in the economic literature on fisheries, the subject of how the value of the catch is shared among claimants has been virtually ignored, Gordon (1954) not excepted.

2.79 The difference in perspective is crucial. Common property resource theory rests on an image of fishermen atomistically overexploiting a fishing ground for the sake of some individual motivation, be it hunger, greed, or a gambling instinct, in order to satisfy themselves. What appears rational to the selfish actor becomes irrational for the society in which he acts. Because of inefficiency, in terms of what could be done to the resource, economic rent is "dissipated"--a pejorative term. In this formulation, efficiency has ceased to be a means and has become virtually an end in itself. When economists thus replace instrumental with substantive rationality, they undercut their ability to work across cultures.

2.80 The literature of economic anthropology, on the other hand, beginning with Malinowski, stresses not the efficiency of material production but the social satisfactions of distribution, and thereby makes the elementary but often overlooked point that fishermen (and firms) rarely act as purely autonomous isolates even when access to the resource is free. By shaping the sharing of the catch, social networks impose upon self-serving individuals a larger rationality of the whole, notably the community's interest in surviving physically, its institutions more or less intact, with some semblance of internal peace. Because of custom, in terms of what could be done for the society, economic rent is "shared"--and that has favorable connotations. It is in this sense that Malinowski's polemic against an overdrawn stereotype of egotistically economic man is nevertheless helpful in approaching fisheries development in a nonindustrial setting.

2.81 The ubiquity, centrality and fragility of distributive norms, the diversity and rationality of fishermen, their use of equality to mitigate scarcity, their concern to defend themselves against the danger implied by risk, and their connection to a larger world in which they have a chance to become geographically and occupationally mobile--these are the themes of the rest of this paper. Before these topics can be taken up analytically across cases in Part III, however, they bear illustrating in detail within the frame of one more study in economic anthropology, Firth's classic work on Malay fishermen. A close review of a single fishery should also demonstrate the merits of microcosmic, ethnographic holism as a method of development research.

2.82 Malays. In 1939-1940, Firth lived among fishermen on the north-east coast of what is now peninsular Malaysia. In 1947 and again in 1963, he revisited the same area (Kelantan). In the resulting book, Malay Fishermen, Firth went beyond his own and Malinowski's early work to describe not only the social context of economic behavior but also the social costs of economic change. No other fisheries writer has matched Firth in focusing and refocusing on the same community over 23 years, and the issues raised by Firth's study still face artisanal fishery developers today.

2.83 In 1940 in the Kelantan village of Perupok, where Firth lived, eight major types of fishing were used in different seasons to capture different species. Of the eight, the "mainstay of the area" was mobile lift-net fishing (takur) (Firth 1966:85). A daytime technique requiring five or six boats, a net, and floating lures, this method provided many man-hours of employment, for motorization was still in the future and lift-nets could be used during more of the year than any other major implement save the hand-held hook-and-line, whose physical yield per unit of effort was inferior in volume and reliability.

2.84 Broadly speaking, mobile lift-net fishing linked three roles in a delicate equilibrium: the expert fisherman-captain (juru selam), the fish carrier-seller (peraih), and the ordinary crew member. Juru selam means, literally, "diving expert": submerging himself in the water, he would listen intently for the sounds of fish, using his knowledge of the different noises made by different species and varieties to estimate the size and composition of a prospective catch. One juru selam confided to Firth that a certain kind of horse mackerel, for example, sounded like the wind; another variety made a noise like the sifting of very dry rice (:101-102). Instructed in his youth by an older expert in the secrets of orally recognizing fish, the novice-turned-expert-himself daily and summarily tested his skills. For the expert was also the captain, and when the net was cast at his command--an operation not lightly undertaken--nature quickly vindicated or refuted his judgment. He was also normally the owner of the net. Of the boats used, at least one was his, and he might have a financial stake in others. He also usually owned some of the bamboo-and-coconut-frond fish lures, and some of these he had probably made himself. Finally, he was responsible for organizing the undertaking, keeping boats and crews together, and distributing the returns.

2.85 The one activity entirely outside the purview of the juru selam was selling the catch. This was done by the peraih (:111-116), who also transported the fish from the point of capture to the point of sale on land. There were three different types of peraih, and they were distinguished by their social and economic distance from the net group, that is, from the expert and his crew. Closest to the group and most common in Perupok before the war was the "parent dealer" (peraih ibu), who belonged to one net organization and worked for it alone, serving as its sales agent. In more than a third of 23 net groups examined by Firth, the "parent" dealer was related through blood or marriage to his group's expert, so the kinship imagery was apt.

2.86 The relationship between the expert and the parent dealer was profitable enough, and reflected enough of a shared stake in the net group, to endure some coolness between them. Labor, on the other hand, was not in those days in such plentiful supply that the expert could afford to be less than cordial toward his crew; if he did not cultivate and maintain personal rapport with them by, for example, drinking coffee with them in the shops, they might, in the local expression, "run" to another boat. And although Firth did not make this point, his material suggests that a positive reason for the expert's apparent lack of interest in the seller's work--sometimes the former did not even know, or at least pretended not to know, what price the latter had obtained for a catch--stemmed from the expert's desire not to be blamed by the crew for a low price, especially since his heavy operational responsibility already made him vulnerable to their disapproval and desertion.

2.87 A second type of seller operated on the fringe of the group. When for seasonal or other reasons, the expert expected a larger-than-usual catch, he might make a one-time arrangement with someone to come out in another boat to pick up and sell any fish caught beyond the carrying capacity of the parent dealer's craft. Although such an occasional dealer was not a member of the group, he was obliged on that one trip, as the parent dealer was on all the group's trips, to join in the physical labor of the net team at sea. The occasional seller hoped that the day's take would be too much for the net group itself to dispose of, for if this turned out not to be so, since he was not part of the group, he got nothing for his time and labor.

2.88 Even more removed from the net group was a third type of seller, the peraih ratar or "wandering dealer," who might come from elsewhere on the coast and not be known personally to the net group at all. His services were accepted at sea on a one-time basis. Unlike the other two sellers, he was not expected to help cast or haul the net and was not trusted to carry off the fish before having paid cash on the spot. The wandering dealer's profit would then depend on what resale price he could get for his purchase later on land.

2.89 In the light of what would happen to it afterwards, four things are noteworthy about the lift-net system in Perupok before World War II. First, the lift-net organization's considerable span of control made it relatively autonomous. It was, of course, ultimately "dependent" on the market

price of fish, and some of its boats might not be fully paid for. Compared to Malinowski's Trobriand field site in 1915, Firth's Perupok in 1940 was not a subsistence economy. But ownership of most or all of the means of production--net, boats, and lures--was located within the lift-net group, mainly in the hands of the expert. Likewise, control over marketing--defined here minimally as responsibility for making the first sale--belonged to another group member, the parent dealer. In theory at least, each incumbent of the three roles--captain, salesman, crewman--worked for himself through a seagoing team of which he was a valued member and which rewarded him proportionally as such.

2.90 Second, however, the net organization was relatively open. The demand for unskilled labor was enough in relation to supply, and the success of different experts differed enough, to promote a circulation of ordinary crewmen from group to group; in the concrete terms of his situation, the Perupok fisherman understood the notion of an opportunity cost and sometimes acted accordingly.

2.91 Third, there was relatively little social distance between physical capital and physical labor. The expert himself embodied parts of both factors of production, for aside from diving and making fish lures, he owed some combination of net, boat(s), and lure(s). A man in charge of the crew in one of the boats in the organization not owned by the expert might himself own that boat and help to haul the net. Most of the ordinary crewmen had only their muscles to contribute. But because of the competition for labor and the consequent prospect of defection, the expert tried to make sure that the economic gap between him and his men--discussed below--did not cool their personal relations. Overall, across all types of fishing, the ownership of capital was not uncommon among those who actually went to sea; about one third in this category owned one or more boats, about three fifths at least part of a net (:135-136).

2.92 Fourth, there was some social distance between physical capital and the marketing function, which were mainly or wholly controlled by the expert and the parent dealer, respectively. Both roles were well rewarded in comparison to the crew, and the two men shared an interest in keeping the team going, but each was vulnerable in his own way, the expert for failing to lure and locate fish, the dealer for selling too low or for claiming later to have sold lower than he did. The greater the appearance of collusion between the two men, the more likely the augmenting of each one's

vulnerability by the other's and the less stable the organization as a whole. 1/

2.93 Until about 1950, mechanically powered fishing craft in Malaya were rare. But by 1963, about 46% of all registered fishing boats had motors (Firth 1966:15). In Perupok in the early 1960s, "in a remarkably short space of time, about eighteen months apparently" (:306), all the leading experts invested in motor boats. At about the same time a new fishing implement was introduced in the village: the purse seine net. Motor boats could tow a fleet of craft about twice as far out as sails and oars had been able to carry it. Faster return trips raised the market value of the catch. The new seines, some of them made of nylon to last longer, increased physical yields to levels substantially higher than those obtainable using lift-nets. There were other differences. Lift-net fishing was a daytime, seine fishing a nighttime method. Lift-netters used hand-crafted lures; seine fishermen used kerosene pressure lamps set on floats. Lastly, the new net was much larger than the old one and required harder work by more men to haul it. Compared to a lift-net crew of 25 or more, the complement for a purse seine could run as high as 40; the most successful seine in Perupok in 1963 was 48 crewmen strong (:106, 308).

2.94 In Perupok, these two innovations, each of which made fishing more productive, were combined. Motor boats could have been used to tow lift-net groups, and some were, but in time mechanized purse seine fishing replaced unmechanized lift-netting as the acknowledged "best" method.

2.95 What socioeconomic consequences flowed from this change in technology? First, proportionally and in gross terms of kind as well as cash, the return to capital and management increased and the return to ordinary labor declined. Very roughly, between lift-netting in 1940 and purse seining in 1963, the share of catch value going to labor decreased from about three fifths to around two fifths (:320). Remembering that the new technique employed more men than the old one, the decline in an individual worker's share was still greater. The larger physical and monetary yield of motorized purse seining did raise the crew member's absolute income despite this

1/ Such patterns are not unique to a less developed country. In the 1950s and early 60s, skippers and net bosses on Norwegian herring ships did not fraternize with one another (Barth 1966:6-10). The skipper was responsible for the ship's course, the net boss decided when and where to lay the net, and a poor catch could be blamed on either. By fraternizing with his men on the bridge, the skipper showed himself no less sensitive than his Malay counterpart to the need to keep their respect. In fact, the tension between the Norwegian skipper and net boss was, from the two accounts, noticeably greater than that between the Malay expert and sales agent. One reason was probably the more extensive recourse to magic or luck in the latter case, which allowed for a relegation of more responsibility for failure onto fate, an evil spirit, or an inept magician.

proportional decline, but meanwhile inflation cut down his purchasing power. Overall, most ordinary fishermen in Perupok were, absolutely, no better off in 1963 than they had been in 1940. Many had lost ground. (For details, see 278-280, 320, 332, 335.)

2.96 The gross return to capital and management between the two kinds of fishing over the same 23-year period increased from about two fifths to some three fifths of the take. Much of this went for operating expenses: fuel, ice, kerosene and the repair of motors, boats and nets. Despite these increased costs, however, purse seine managers appeared to be substantially better off in 1963 than lift-net experts had been in 1940.

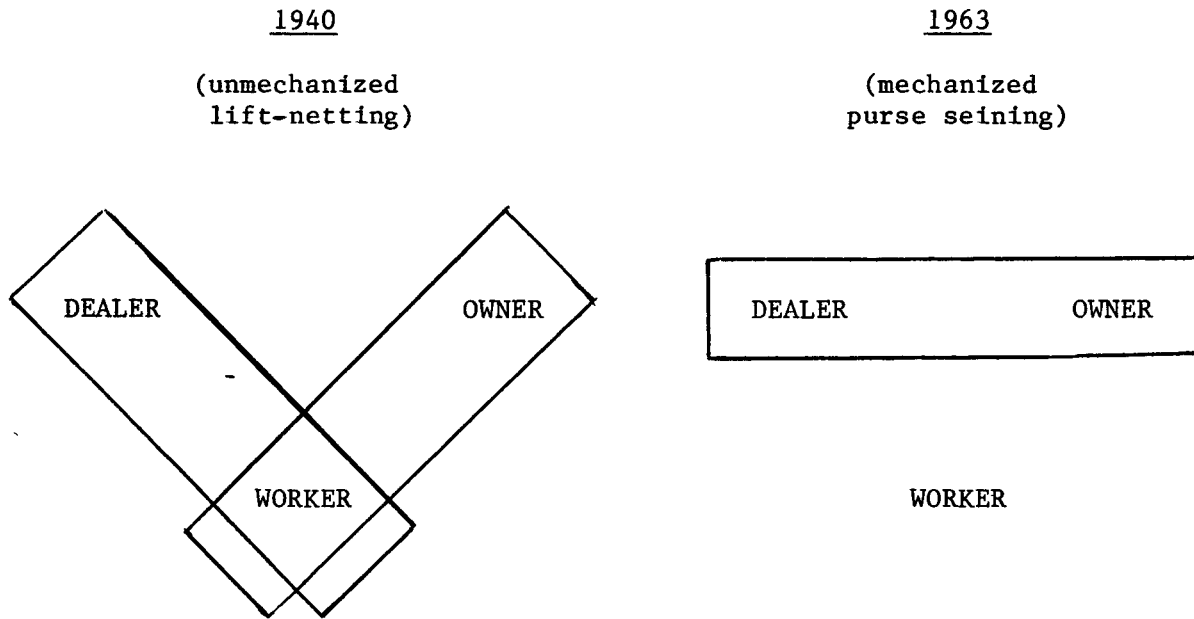
2.97 On the social side in Perupok over this timespan, demographic growth, economic concentration, and class stratification increased the distance between management and labor. The number of fishermen entirely without capital went up both absolutely and proportionally (:342). A new class of fish dealers arose, who controlled not only marketing but productive equipment as well.

2.98 Previously, the main owner of capital, the expert, working alongside his men at sea, courted labor, the linchpin of the system. The parent dealer helped to haul the net. Although the dealer and the expert earned more from fishing than a crewman, the first two men did not generally join forces to exploit the third lest they lose him. In other words, a certain horizontal distance between seller and expert was carefully maintained, whereas the vertical distance between these managers and the boatmen was kept to a minimum.

2.99 By 1963, the system's center of gravity was no longer at sea but on land, where the dealer-owner-manager operated as the community's new "economic aristocrat" (:343), one of its "rich men" (:345). Who were these new entrepreneurs? Some were experts whose initial investments in motorized seining had paid off. But most were former fish dealers who had bought their way into production. As the social distance between dealers and owners decreased, the distance between these roles and that of an ordinary worker enlarged--roughly as in Figure 1.

2.100 The shift carried an important racial dimension as well. Even before the war, in the Trengganu region south of Kelantan, financiers had acquired roles in ownership and production. (Trengganu's fishing economy was somewhat more commercialized and export oriented than her northern neighbor's.) Chinese moneylenders in Trengganu had enabled Malays to buy equipment in return for the right, for the life of the debt, to market every catch and extract a commission each time as "interest" (:60). The longer the principal remained outstanding and this arrangement continued, the more it would appear to an observer that the Malay had become, in effect, a wage earner at a piece rate for a Chinese financier-owner-dealer. As one Malay fisherman told Firth in 1940 when asked whether he liked the system, "It's not that we don't like it, sir. We get enough to eat. But there's no chance of saving" (:62).

Figure 1: CHANGING SOCIAL RELATIONS BETWEEN ECONOMIC ROLES
IN THE DOMINANT MODE OF FISHING IN A MALAY VILLAGE



Note: Roles within the same oblong tend to be socially close, perform some of the same work, or be filled by the same person. The diagram abstracts, for Perupok, the evidence in Firth 1966.

2.101 In Kelantan in the 1960s, the new motors and nets were bought from Chinese who were sales agents of commercial firms headquartered outside the region and supplied from outside the country. Such men were essentially "foreigners" with no interest in getting involved in the details of rural marketing, let alone in actually assuming responsibility for the sale of the catch. This left the way open for local, Malay fish dealers to buy the new equipment, pay for it from earnings and become owners in full. In so doing, they "widened the gap between themselves and the ordinary Malay fishermen" (:315). Meanwhile, in other modes of fishing, the system of loan-secured preemptive marketing made its appearance in Perupok under Malay auspices (:337-339). (Before the war, Malays in Perupok also loaned money to one another for productive purposes, but the financier received "interest" in the form of a share in the value of the catch unaccompanied by a preemptive right to negotiate that value [:169ff.] .)

2.102 In view of the gulf that has long separated Chinese from Malays, perhaps the most remarkable indicator that these technological changes had torn the social fabric of the Malay community was that in 1963, Malay fishermen referred to Malay owner-dealers as tauke (or towkay), a term previously applied, often with disapproval, only to Chinese dealers, money-lenders, and merchants (:343). By that year, from Firth's account, all of the four characteristics of Perupok fishing organization previously cited for the "mainstay" case of lift-netting had changed. Not only had the social spaces between roles been rearranged away from a kind of patron-client intimacy toward horizontal stratification along incipient class lines, but fishing groups had become closed and fishermen more bound by their debts to a rising, and resented, Malay "capitalist class" (:161, 324).

2.103 Perupok's experience, shared as it is by so many other Asian and Pacific fishing villages (see below and Part III), is instructive in several ways. Confirmed again is the proposition that increasing production through capitalization is likely to be accompanied by increasing inequality in distribution. Demonstrated again is the fragility of social norms of sharing when these are pitted against the opportunities for profit that technological change can open up.

2.104 Implicit in these results is a perspective on development itself. For the story of Perupok is not the story of a government project. The shift from unmotorized lift-net to motorized purse seine fishing was accomplished quickly and spontaneously by local entrepreneurs who bought their hardware on the open market. Originally (before Firth arrived) a subsistence community, Perupok witnessed, first, commercialization and, later, capitalization as phases in the long-run, autonomous, unofficial, and to some degree probably unavoidable process called modernization. Persisting if not increasing absolute (and sharply rising relative) poverty; class stratification and the separation of labor from the means of production; the growth of monopsony against fishermen and indebtedness among them At the risk of exaggerating, one can almost see in this process an anthropo-economic counterpart to bioeconomic common property theory: the "tragedy of the commoner." And one can doubt whether fisheries development will be able to avoid or even significantly to lighten these results so long as its

main task is defined, in the terms of biology, economics and law, solely as marine resource management, rather than also, anthropologically, as maritime community assistance.

2.105 As an illustration, reconsider Gordon's remark on "the great immobility of fishermen." To him, this was a traditional characteristic of their isolation, which limited their contact with the outside world. By implication, if modernization could link them with centers of finance and discourse inland, they would become less tied to their immediate surroundings. On the contrary, fishermen in Perupok in 1940, their labor still in demand, enjoyed some leverage over their working environment and were relatively free to respond to opportunities as these arose. The openness of net groups promoted lateral mobility within the fishery and the lack of long-term debts allowed fishermen to seek their fortunes outside it. Motorization and the shift to purse seines, on the other hand, closed the working group, bound its members in debt to an exclusive dealer-owner elite, and thus locked fishermen into a situation in which, to recall the words of one of them, "there's no chance of saving."

2.106 Reversing Gordon's scenario, fishermen can be modernized into immobility, locked financially and therefore physically into dead-end conditions from which they cannot extricate themselves. Especially where biological overfishing is already under way, fisheries developers may wish to pay special attention to the need to reinvigorate an original mobility among fishermen that demographic and economic growth may have combined to enfeeble.

2.107 Monographs on Asian fishing communities that followed Firth's original study sacrificed depth for scope. Laid in Japan and southern Thailand, respectively, Norbeck (1954) and Fraser (1960) were major works. But compared to Firth, these authors slighted details of the distribution of catch value in order to cover other aspects of village life more fully. Norbeck and Fraser did, however, portray the fishermen's adaptation to technological change, notably mechanization: paralleling the trends just discussed, individualistic behavior became more common and social sharing less so, elite status coincided more with wealth, and the community as a whole became less isolated from, but more dependent upon, outsiders.

2.108 As for the recent literature in anthropology listed in Table 2, it is best considered not in its own right but integrated into the topical analysis in Part III. Suffice it to say that Pollnac (1976) and Smith (ed. 1977) both reflect the previously noted tendency of writers on fisheries to include more variables, cross more disciplines, and offer more complex models.

5. Summary

2.109 If artisanal fishery development is conceptually ambiguous, that is in part because of its location on the mental maps of policymakers somewhere between the community focus of rural development inland, where people live, and the commodity focus of resource management farther out to sea, where the fish are. Over time, the scope of fisheries-related academic

writing has, in effect, expanded landward, away from natural toward social science. Illustrating this trend are shifts in goals and guidelines, notably the addition of distribution to production and conservation as major concerns and the superimposition of OSY on MSY and MEY. At the same time, extended jurisdictional and enhanced technological capacities have expanded the interests of coastal estates seaward toward the resource.

2.110 This convergence could encourage a better fit between Western concepts and the realities and abilities of developing countries, and artisanal fisheries development could benefit accordingly. Software devices could be "stepped down," if necessary, and transferred: MSY in biology, MEY in economics, and systematic thinking of the sort facilitated by OSY across disciplines.

2.111 On behalf of MSY, for example, an initial biological accounting might calculate and compare only three indicators: total catch weight, catch weight per unit of effort and juveniles as a proportion of the catch. Collected by and shared among the fishermen on behalf of the community's interest in conserving the resource, such information could be made as regular and reliable as it would be pertinent. In adapting MEY, on the other hand, the notion of opportunity cost, which facilitates synoptic thinking, could prove more useful than the stress on efficiency, which may not serve distributive needs for protein and employment.

2.112 As developing countries mechanize and commercialize their fisheries, small-scale operations close to shore may be misunderstood by indigenous elites who have restructured their perceptions to conform with foreign models. If it is true that the "appropriateness" of any technology is meaningless without knowledge of the situation in which it is to be used, it is also true that a situation can be wishfully re-perceived to make it seem an "appropriate" place to use technology in whose intrinsic utility developers have come to believe. 1/ In the latter case, one fallacy compounds another.

2.113 Consider the notion of a common property resource. Writings in all three disciplines have tended to center around this idea. Biologists have inferred from it an inexorable "tragedy of the commons." Economists have seen it leading to inefficiency and "dissipated rent." Legal opinions have upheld or opposed its Grotian rendition as "freedom of the seas." Yet how applicable to an artisanal fishery in a poor country are the assumptions that underlie such arguments?

1/ Consider, for example, the faith and finance spent on the high technology of fish meal for human consumption (fish protein concentrate), as if this substance could significantly reduce malnutrition among the Third World poor. Instead, because it was expensive to make, those who could afford the product did not need it. For details, see Pariser et al. 1978.

2.114 Common property reasoning posits the uniqueness of a medium that cannot be appropriated (water) compared to one that can (land). Yet an artisanal fishery, in which fishermen rarely remain at sea for more than a day at a time, straddles the borderline between these milieus. Plausibly, on the high seas, where ships of different nations chase pelagic stocks, one vessel has no reason to leave fish uncaught lest another vessel catch them, and "free for all" competition results. Toward shore, however, where kin and neighbors seek a livelihood day after day from a smaller and shallower marine space, hunters are far more likely to share proprietary feelings about their obviously limited quarry, especially when it appears threatened by larger and more mechanized commercial vessels manned by outsiders.

2.115 There is no universal "tragedy of the commons" that inheres, like a script waiting to be enacted, in all resources of a given kind. There are, for the same resources in different places, tragedies of different kinds played by differently motivated actors at different speeds. In one location, rapid growth in a human population that preys upon a slowly growing animal one may gradually destroy the latter. Not far away, regardless of demography, rapid escalations in capture technique may quickly destroy the same kind of biomass. In a sense, artisanal fishermen who object to mechanically superior outside competition for "their resource" are acting, in effect if not intention, to slow down the tragedy's local run--a point easily grasped neither by a strongly productionist elite, in whose eyes traditional fishermen may appear backward, nor by a pure common property theorist, whose resource-centered model may not allow for differences among human predators in capacity, motivation and, therefore, impact. Nor does it follow that sole or monopoly control will necessarily raise the priority of conservation as a goal, for owners are not less diverse in their intentions than operators.

2.116 This is not to deny the contributions of common property theory. If access or "ownability" as a resource-fixed constant can be recast as one among many variables, a more contextual perspective should result. Constructive too is the sense of limits that criticism of free access fosters and controlled-access jurisdictions embody. For limits imply scarcity, and if scarcity is recognized, in contrast to the pressing needs of the adjacent poor, distributive aspects of fisheries development become harder to overlook.

2.117 Few resources, many variables. That is the lesson of the literature in biology, economics, and law. To be at once solicitous of an empirically finite biomass and sensitive to the analytically infinite contexts in which it is reproduced, captured and used. That is the challenge of artisanal fisheries development. Nor will that challenge be fully met if biological scarcity or economic inefficiency is allowed to justify defining the development task as marine resource management alone. On the contrary, as depletion and underemployment increase under mounting socioeconomic pressure, the more obviously essential it is to look inland, away from the fish, at the communities from which so much of that pressure comes.

2.118 Ultimately, beyond the helpful holism of recent bioeconomics and law, this reorientation must involve anthropology. That discipline offers, first, a method: sensitivity to context and attention to detail during firsthand appreciation of the life of a fishing community and what that life means to its members. Unlike computerized bioeconomic modeling, the software of ethnography is neither esoteric nor dependent on advanced hardware, and fisheries developers in developing countries should find its previous insights useful in suggesting local possibilities that might otherwise be overlooked. Among these ideas are the importance of distribution at the heart of village life, as expressed in the specification of shares; the instrumentally rational use of material exchanges to serve social relationships rather than the other way round; and the dispossession and immobilization of labor and the concentration of capital that can accompany technological change. In sum, with an anthropological lens, the task of fisheries development can be viewed not only as marine resource management, a matter of fish, but also as maritime community assistance, a question of fishermen.

III. PROBLEMS

"It is as important to study fishermen as it is to study fish."

--A fisheries adviser (Medcof 1963:89)

3.1 Notwithstanding the utility of anthropology, of the four disciplinary perspectives covered in Part II, none is inherently superior to another. Each is incomplete. And that reposes the question of priorities opened in Part I. If distribution is as important a goal as production and conservation, if maritime community assistance is as important as researching fish, where is the payoff for policy? For the essence of policy is priority. If the whole-system models of bioeconomics are already "data devouring" (Crutchfield 1977:382), how helpful is the introduction of legal and cultural variables that will make them even more so? Policy decisions cannot be indefinitely postponed for the sake of additional information.

3.2 Policies are arrived at through deduction and induction. As illustrated in Table 1, policymakers can be helped to clarify and rank their goals and to derive from these a set of questions worth researching in the field. The results of that research can then be fed back into the policy-making process. Alternatively, however, those responsible for fisheries policy may wish to begin inductively by scanning the phenomena to be developed--becoming empirically knowledgeable first so that normative choices made later will be realistic.

3.3 As demonstrated in Part II, an appreciation of different viewpoints on fisheries development can enrich the first, value-sorting strategy. Moving from biology through economics and law to anthropology, the development task can be redefined on a spectrum between, or as some combination of, marine resource management and maritime community assistance. Using the same cross-disciplinary range, priorities can be allotted to production, conservation and distribution as goals of management, or to amelioration, regulation and participation as goals of assistance.

3.4 Within the same class of goals, each discipline also raises for consideration a unique emphasis. How important is it, for example, that production be physically sustainable (biology), efficiently realized (economics), administratively controlled (law) or locally legitimate (anthropology)? Only persons responsible for policy can answer such a question, but disciplinary perspectives can help to raise it.

3.5 In addition, during policymaking's inductive phase, disciplinary perspectives can help development planners to draw up an agenda of "right questions" that should be asked in the field. At first glance, this may seem like putting the cart before the horse. In the absence of a development goal, how can a research question be "right" or "wrong"? Without a guiding aim, how can one compare the usefulness, say, of the following

questions, each suggested by and roughly summarizing one discipline's perspective. From biology: How extensive or endangered is the existing biomass? From economics: What are the opportunity costs of fishing as it is now conducted? From law: How much freedom of access to the resource do fishermen currently enjoy? From anthropology: What does the fishery presently mean to its participants? 1/

3.6 The solution flows from the unique nature and context of inshore fisheries in lower-income countries. Artisanal fishing is preeminently marginal, not in the sense of redundant or cost-ineffective (though these adjectives too may apply), but as an activity between human beings and fish undertaken in a zone neither inland nor offshore. It is therefore vital that policymakers be reminded of the vast field of variables in which a physically small-scale fishery sits. Artisanal fishery development researchers cannot afford to begin with the concerns of only a single science. Disciplines, as noted in Part II, have their biases, and once one outlook is learned, it may prove hard to unlearn. But neither can all four approaches be adopted simultaneously--least of all in a setting where familiarity with any one of them is rare.

3.7 However its task is defined, artisanal fisheries development requires knowledge of how fishermen and fish behave. In a project's preparatory phase, this knowledge must be unspecialized enough to open the eyes of those who acquire it to prospects and obstacles that they might not otherwise recognize. The two disciplines with the strongest comparative advantages in the holistic study of fishermen and fish, respectively, are anthropology and biology.

3.8 It follows that, as points of departure for inshore fisheries development in low-income countries, other things being equal, anthropological and biological questions should prove more useful than economic or legal ones. Biology is basic. Depending on whether the resource is physically under- or overfished, radically different implications for development result. The more exploitable the biomass, the more defensible (up to MSY) is production as a goal. Conversely, the less exploitable the stock, the more urgent its conservation. The advantage of anthropology, on the other hand, lies in understanding the behavior of fishermen and their families as members of rural communities that may need assistance not for the sake of the resource but in their own right.

3.9 The policy consequences of discovering economic efficiency or inefficiency are less clear-cut. An immediate need for protein may make inefficiency tolerable, since for most species MEY yields less by weight than MSY. Data on the opportunity costs of labor and capital are extremely valuable, for they can help decision makers to decide whether, in the long run, to try to attract people into or out of the fishery. But in a labor-surplus

1/ Other disciplines suggest still other questions. Political science: How are fishery decisions made? History: How has the fishery evolved?

economy where short-run alternative job opportunities for fishermen are likely to be few, the labor-expelling implications of efficiency may be unattractive. Logically, in such circumstances, biological, not economic, overfishing is of primary concern.

3.10 As for law, its point of view is largely instrumental: how to adjudicate, negotiate or codify appropriate management rules. Sole legal ownership enables but does not determine action, especially in a developing country where laws may be violated or ignored with impunity and where the adversary bias of Western jurisprudence may run against local habits of conciliation through social mechanisms rather than courts. The legal perspective can be constructive, especially when domestic artisanal and foreign industrial fisheries collide, but to start out thinking mainly in legal terms seems unwise. As for bioeconomic theory, the limited applicability of its insights to small-scale, low-income, labor-intensive fishing has been demonstrated. Too preoccupied with Western, industrial fisheries, too committed to common property resource theory, too advanced in its mathematical methods and accordingly too insensitive to precisely those social, distributive and qualitative considerations that are likely to influence inshore fishing in a developing country, bioeconomics affords a poor springboard from which to launch development. 1/

3.11 Just as biological monitoring methods could, as proposed earlier in this paper, be "stepped down" for community use, so an anthropological perspective could be used by local observers and participants to help make development indigenously meaningful. Consider, for example, the "naive" question, "What is your most important problem?" Incredibly enough, this simple query is almost never put to fishermen and their families. Yet if outside developers define as a problem what people who live in the targeted community do not themselves see as such, and vice versa, and if no efforts are made to engage in two-way learning across this gap, how can the ensuing project be anything but an exercise in mutual irrelevance? Consider, too, the rarity outside anthropological writing of answers to the question, "How is catch value shared?" Yet that is distribution in a fishing community.

3.12 In the next two sections, one on assumptions and one on issues, some of the policy implications of a "bioanthropological" outlook will be examined. Rather than merely recommend a checklist of patently cultural aspects of community life that bear investigating (kinship and status structures, fisheries ritual and lore, and so on), the discussion will focus on two common, influential, and often hidden assumptions held by outsiders (that fishermen are homogeneous and irrational) and on three crucial but controversial policy issues (how to introduce technology, handle middlemen and integrate development projects).

1/ Also, whereas bioeconomics in general and common property theory in particular grew out of the study of single-species fisheries in the Northern Hemisphere, tropical Indo-Pacific waters and the fisheries they sustain are mostly multispecies--sometimes extremely so. (See Briggs 1974:13-14; Gulland 1974:303; Ricker 1977:20; Tiews 1973:282.)

1. Assumptions

3.13 Subjectivity in fishery development cannot be eliminated. But one can try to ensure that official biases are constructive. If the kinds of questions Firth sought answers to through ordinary observation and conversation in Perupok are rarely pursued in that way by fishery policymakers, the assumptions these officials hold about the fishermen they are trying to help are still less frequently examined. Yet because decision makers, and those who implement decisions, act as if their assumptions were true, that is where policy reforms must begin.

3.14 Diversity. A first task in helping any group of people is to define the group in such a way that relevant differences within it and relevant factors outside it can be related to its welfare. When a formal definition is not consciously made, an informal one tends to remain or to develop unexamined in the mind, and because the latter kind represents natural or tacit understanding, it may influence conduct more. The task of definition therefore usually involves redefinition.

3.15 Redefinition becomes urgent when the common word for a member of the group carries a falsely monolithic image. So it is with the word "fisherman" in English. Webster's Third New International Dictionary (1976 ed.) defines a fisherman as "someone who engages in fishing as an occupation or for pleasure." If the last three words are dropped in order to exclude the sport fisherman, two criteria for inclusion in the category are left: first, that a person perform the fishing act, and second, that his performance constitute the person's occupation. Occupation, in turn, connotes vocation or profession: the major, long-term, income-earning activity of one's life.

3.16 These two criteria--an activity and its importance--are not jointly necessary conditions of being a "farmer". In the same dictionary, "a person whose primary occupation is the raising of crops or livestock" is only one of several meanings of "farmer". This greater range occurs partly for the simple reason that most human beings live on land and not at sea. Also, in many countries, fishermen are looked down upon (Anderson 1969:443; de Silva 1964:259; Pollnac 1976:45; Saha 1970:100; Ward 1967:274). Under these conditions, it is easier to believe that fishermen are similar, or even all alike--much as one's distance from a forest conceals variation between individual trees.

3.17 Also, while the terminology of agriculture accommodates a variety of ways of separating ownership from access--through rental, usufruct, sharecropping, wage labor, and so on--the absence of "sea tenure" prevents "sealords" from being distinguished even crudely from a maritime peasantry, and differences in access to the means of production between members of the latter group are blurred. The term "farmer" originally meant "renter," implying an institutionalized socioeconomic relationship between two people. The term "fisherman" has always merely juxtaposed, in the fleeting, physical act of capture, the person and the fish.

3.18 In reality, fishermen vary so greatly in so many different settings that the ordinary, nondiscriminating, context-ignoring notion of a fisherman as someone who fishes for a living is virtually useless as a policy tool. Circumstantial diversity dwarfs the uniform label.

3.19 Consider, first, the nature of the fishing act, as determined by the technique used and species caught. Marine fish detection methods range from the hearing and eyesight of Malay experts to the sonar and spotter aircraft of Chilean anchovy hunters. Implements of capture run from the bare hands of some Caribbean fishermen to the 50 mile-long, power block-operated, baited lines of the Japanese tuna fleet (Price 1966:1366; Idyll 1970: ch. 11). In 1923, an observer of artisanal fishing in Ceylon catalogued 150 different types of gear then in use, and "a large number still remain[ed] to be described" (Pearson 1923:65). Each type of gear on the island had its own distinctive local name. When government officials, for reasons of conservation, wished to regulate the use of a certain implement, they were hard put to include in the decree all the different local terms for its different versions. Officials even suspected fishermen of altering their nets just in order to rename them and evade the law.

3.20 Table 3 shows the results of an inventory of the different kinds of gear in use in 1955 in the Central Visayas in the Philippines--10,378 instances in all. The 15 major modes of fishing listed in the table range from simple to complex, man- to motor-powered, low- to high-yielding, shallow- to deep-water. The modes comprise 31 distinct submodes, and within each submode further variation occurs. (The list covers marine fisheries only and excludes illegal means such as poison and dynamite.) Nor is this illustration atypical of the Asian-Pacific tropics. So many and varied are fishing methods that, as one anthropologist put it, "one may harbor certain nominalist misgivings about the unity or reality of 'fishing' as a subject for investigation" (Hewes 1948:238).

3.21 The variety of fish in the tropics partly explains this variety of techniques. A listing of fish in Philippine (including Visayan) waters, for example, identified 2,277 species belonging to 716 genera and 205 families (Tiews 1958:78, citing Herre). While one method selectively attacks or entraps a single species, another (e.g., trawling) indiscriminately hauls up everything in its path. Because gear range from costly import to local artifact and species from commercially prized to virtually worthless, to use a particular type of gear to seek a particular fish is to become involved in a unique set of economic transactions that radiate backward and forward in space and time from the place and moment of capture.

3.22 Nor are these associations merely economic. The ritual importance of shark fishing among the Trobrianders and the pre-Christian Tikopia has already been mentioned; Cantonese fishermen in Hong Kong still consider sturgeon, sawfish, and porpoises "sacred" (Anderson 1969:444). In some fisheries, specific gear may be used almost exclusively by a specific ethnic group; examples include the Buginese who man the stationary lift-nets in the Madurese community of Muncar in East Java (Emmerson 1975:5) and the Melanau barong (small boat) fishermen of Sarawak (Elliston 1967:14). Weather, fish cycles

Table 3: THE RELATIVE FREQUENCY OF SOME MAJOR WAYS OF CATCHING FISH IN THE CENTRAL VISAYAS (PHILIPPINES)

Technique	Percentage Frequency
1. Longlines	0.8
2. Shelters	0.9
3. Seines (nonbeach)	1.0
4. Trawls	1.5
5. Gill nets	1.9
6. Drive-in nets	2.1
7. Complete barriers	2.1
8. Corrals (deep)	2.4
9. Bagnets	4.1
10. Filter nets	6.6
11. Hand lines (with lights)	7.1
12. Corrals (shallow)	10.3
13. Seines (beach)	10.9
14. Hand lines (without lights)	22.6
15. Pots	25.3
Total	99.6

Note: Adapted from Rasalan (1957:59). The survey covered the Panay Gulf, Guimaras Strait, Northern Capiz, Visayan Sea, and Asid Gulf. The total does not equal 100 due to rounding.

(reproduction and migration), fish prices, gear prices and the ethnicity, religion, health, wealth and indebtedness of the fisherman are just some of the variables that affect his decision whether, how and for what to fish. 1/

3.23 Not only is there great diversity in fishing across different fishermen at the same time and in the activity of the same fishermen over time, if the term "fishermen" is enlarged beyond those who participate physically in the act of capture to include persons who share the value of the catch, even limiting the latter to immediate beneficiaries only, a third kind of variety appears. Table 4 illustrates this multiplicity of directly

1/ Even the sexual reputation of a man's wife can influence how he fishes, as when a Kerala fisherman is forced to set out alone with hook and line after having been dropped from a net organization lest his wife's rumored impurity cause the goddess of the sea to become angry and swallow the crew in a storm (Rama Rau 1962:vii; Sivasankara Pillai 1962: 159ff.).

Table 4: SHARING THE VALUE OF A ONE-TON CATCH IN MUNCAR,
EAST JAVA, INDONESIA

Recipient	Percentage of total (rupiah) value of catch accruing to <u>each</u> recipient
<u>Person</u>	
1. One boat owner (<u>juragan darat</u>)	20.06
2. One captain (<u>juragan laut</u>)	9.18
3. One boat cleaner/guard (<u>penguras</u>)	8.15
4. One net caster (<u>pembuang jala</u>)	7.92
5-9. Five ordinary crewmen (<u>pandega</u>)	6.67
10. One dealer (<u>blantik</u>)	4.41
11. One financier (<u>pengambek</u>)	3.34
12. One scale owner (<u>timbang</u>)	.77
13-19. Seven porters (<u>manol</u>)	.47
20-26. Seven dealers	.44
27. One scale owner	.38
28-39. Twelve porters	.14
40-49. Ten women and children, who successfully asked for fish (<u>ngujur</u>) or "helped themselves"	.02
<u>Organization</u>	
1. The official district "auction" administration, which levied what amounted to a tax on the fish just after they were beached	1.25
2. A fishermen's supply shop, to pay for kerosene and kerosene pressure lamp mantles used to attract the fish	2.93

Notes: These data describe returns from a catch of approximately 996 kilograms of immature mackerel caught inshore in an unmotorized, medium-sized boat with a traditional surface seine about 55 meters long during the night of 13-14 March 1975. The total value of the catch (23,930 rupiahs including in-kind equivalents = about \$58 = 100%) is the product of its repeated sale and resale on land between 05:45 and 06:45 on 14 March. By volume, the catch filled 38 baskets, of which 24 were bought by a fishmeal maker, 10 by a pemindang, and 4 by another pemindang. With hired and family labor, the pemindangs steamed and salted the fish, packaged them in small banana-leaf-and-bamboo baskets, and resold them. Their operations were very labor-intensive, as was that of the fishmeal maker, whose workers dried and pulverized the fish for resale as animal feed. Information for the table was obtained by following the fish from the time the boat dropped anchor until they had been sold to the fishmeal maker and the pemindangs. Words the fishermen themselves used are given above to stress the differentiated character of fishing-related roles.

catch-dependent roles using data gathered by the present author for a single catch landed in Muncar, East Java, Indonesia.

3.24 Initially noteworthy about the people classified in Table 4 is their number. Excluding the shopkeeper who sold supplies for the fishing trip, the officials who taxed the catch, persons who added value to the fish by processing it, those who bought and sold the processed product, and those who finally purchased the fish retail and consumed it, nearly 50 people enjoyed, in cash or kind, at least a small portion of the catch. From a bioanthropological point of view, just as a development project's impact on the marine ecology of fish must be considered, so must the effects on the crowded, fragile network of human interdependence in the maritime community that receives the catch. To focus on fishermen as physical producers only and to try to change their fishing effort on behalf of production or conservation without regard for the intensely distributive local ramifications of such changes is to distort, if not doom, artisanal fisheries development.

3.25 Additionally striking about Table 4 is the variety of roles that it displays. Of the ten personal functions listed, each with its local name in italics, only three (captain, net caster, ordinary crewman) were performed at sea, and these together accounted for only seven individuals and received only half of the total value of the catch. Should the boat owner who obtained a fifth of the total be considered a fisherman or not? How about the man who worked only between trips, cleaning the boat and guarding it? The financier who funded the endeavor? The men who owned the scales on which the catch was weighed? The dealers who sold and resold it between weighings? The porters who jogged down pathways carrying it? Only the women and children who surrounded the boat and in the confusion of unloading it managed to obtain a few fish did not help in some way to create the value of the catch.

3.26 Nevertheless, fishery development in Muncar as it was practiced at the time was meant exclusively to help incumbents of seagoing roles to catch more fish. These were the men officials had in mind when they referred to "fishermen," using an Indonesian word: nelayan. This name was almost never heard in conversations among the Madurese and Buginese who lived and worked in Muncar, and is not listed in Table 4, not because the Indonesian language was locally unknown but because the word was not useful, for it omitted most, and failed to specify any, of what the villagers knew were distinctive fishing-related roles.

3.27 The lesson for developers--made poignant in Muncar's case by the tragedy to be discussed below--is to disaggregate the development situation. A narrowly homogeneous notion of fishermen as mere physical producers is unhelpful; so is the undifferentiated counterconception of fishermen as all who live in a "fishing" community. Surplus labor and underemployment in an artisanal fishery in a developing country can accompany a degree of social specialization--cf. "agricultural involution" (Geertz 1963)--not easily appreciated by observers accustomed to single-method, single-species, capital-intensive fisheries in higher-income countries. Bioanthropologically, just as the fish require a taxonomy, maritime villagers should be sorted out according to their various functions, and these should be named using local

languages so that a project and its intended beneficiaries can be locally understood. And Table 4 suggests one way to draw such an indigenously significant occupational map: by following the fate of a single catch as its value is shared out among locally meaningful roles.

3.28 As for the second part of the standard definition, that fishing be the major occupational activity of fishermen, on this score, too, great variety has been recorded. In the Central Visayas, most of those who fished were also engaged in farming; very few devoted themselves entirely to fishing (Rasalan 1957:85). In Singapore, around one fifth of all fishermen using licensed boats and gear spent enough time at other, land-based occupations not to be "principally engaged in fishing" (Burdon 1955:5)--to say nothing of fishermen using unlicensed gear. In what was then East Pakistan (now Bangladesh), part-timers comprised about two fifths of all marine fishermen (Malik 1965:349). In Indonesia, more than half of all fishing households actually engaged in the activity for only six or even fewer months out of the year (Indonesia 1974:7). 1/ Apart from whatever pull nonfishing opportunities exert, the seasonality of fish migration, the rhythms and vagaries of tides, winds and weather, even the unequal competition of full moons and fishermen's lanterns for the attention of sea creatures at night, all make full-time, year-round fishing in any literal sense chimerical. Were the dictionary definition of "fishermen" strictly applied, few of those who fish would qualify.

3.29 This is more than an academic matter. Typically, fishery development is meant to help full-timers, and if a project succeeds, it may encourage others to become full-timers too. The bias is not hard to understand. In 1973-76 in the Philippines, for example, the Rural Bank of Coron in Coron/Tagumpay, northeast of Palawan, made about 300 loans to fishermen for the purchase of boats, engines and other equipment. Of these loans, by 1976, only 16% had defaulted. One reason for this relative success is that loans were limited to fishermen who already owned a hull of some kind and held a Coast Guard-issued fishing license. That is, most of them were already fishing full-time. Most of the few defaulters, on the other hand, turned out to be part-timers and may even have included persons who did not fish at all (Baum and Maynard 1976c:24). Because a fishery loan is normally meant to be repaid out of increased catch values made possible by the equipment purchased with it, the greater the fisherman's effort, other things being equal, the more certain and rapid the repayment and the greater the lender's capacity to recycle the returns by making more loans to more fishermen in the future. In this light, part-timers are not popular with policymakers.

3.30 The problem of collateral is critical. Many rural banks do not lend even to fishermen who own boats, but insist on land or property fixed on land, discriminating against poor fishermen as well as part-timers. There is

1/ These conditions are not unique to Asia. In a sample of 233 Ghanaian crewmen observed during 13 consecutive seasons in 1967-68, for example, none fished more than 7 (Christensen 1978:18, citing Naomi Quinn).

no simple solution. But lending institutions that specify physical or fixed collateral should recognize that their strategy is basically defensive and passive. Tangible assets are a surrogate for detailed personal knowledge of an individual's likely capacity and willingness to repay. The latter kind of credit rating can be obtained only through acquaintance, and loan officers typically lack the time to research the reliability of every potential recipient. The more project personnel have studied local social networks, however, the more they will know about the skills and reputations of individuals whose behavior inside or outside the fishery, may crucially affect project success.

3.31 There are even circumstances under which part-timers could be the better risk: if the Philippine example mentioned above is enlarged to allow comparison between whole communities, a different pattern emerges. Across five different artisanal fishing populations in the Philippines including Coron/Tagumpay, the relative success of development efforts including loan repayments is positively correlated with the proportion of fishermen in each population who have secondary occupations (Baum and Maynard 1976a-e). Although many other variables are, of course, involved, a higher proportion of part-timers in a fishing population may reflect the greater economic health of the area as a whole. In their search for needy, full-time fishermen, development agencies may neglect the possibility that such men are more likely to be found in an economically stagnant community with few alternative sources of income. Conversely, the presence of part-timers may indicate greater economic dynamism and more psychological and social mobility in, and openness to, the nonfishing world. Again, the caveat about other things being equal is crucial; men driven by declining catches and rising debts to sell their labor on land are no cause for optimism. But, at the beginning of a fisheries development project, before the imperative to ensure repayment is allowed to dictate a preference for full-timers, the question might usefully be asked: What are the opportunity costs of helping full-time rather than part-time fishermen?

3.32 Consider the fishermen of Tobuan/Sual in Central Luzon: Baum and Maynard (1976a) criticized them for lacking "discipline" (:40-41), for failing to follow a "regular and steady work schedule" (:24), for not fully using the equipment made available to them through loans from the Development Bank of the Philippines (DBP), and for their "unbusinesslike attitude" (:41) in not repaying those loans. Artisanal fisheries development in Tobuan/Sual, clearly, has failed (:22).

3.33 Why? Table 5 shows that, among Baum and Maynard's field sites, Tobuan/Sual had relatively high percentages of respondents, first, who were full-time fishermen (that is, lacked a secondary occupation), and second, who were willing, given an alternative, to leave fishing altogether. Noting that the Bayawan sample overrepresented full-time fishermen (Baum and Maynard 1976e:6, 9), and although Salay and Coron/Tagumpay are out of line on the mobility variable, Table 5 suggests that in the Philippines--therefore possibly elsewhere too--full-time fishing and willingness to abandon that occupation may go together.

3.34 The high incidence of loan defaults in Tobuan/Sual, unlike those of Coron/Tagumpay, did not implicate part-time fishermen. Baum and Maynard (1976a) found instead that Tobuan enjoyed a special position and reputation in building outrigger canoes (bancas), that there were three small boatyards in the area, that all three were owned by the same family and that "most" of the DBP-financed boats had been built in one of those yards. This raises the possibility that loans may have been made less to benefit fishermen than to provide business for the yard. Local informants also reported that DBP officials were lax in collecting, that their policy was, in effect, one of "social financing" (:22). Possible ties between boat builders and loan administrators might help to explain why the DBP did not put pressure on recipient fishermen to repay. Viewed against the officials' own "unbusiness-like" stance, the fishermen's "indiscipline" becomes easier to understand.

Table 5: THE PRIMACY OF FISHING AS AN OCCUPATION AND THE WILLINGNESS TO LEAVE IT, IN THE PHILIPPINES

Respondents' Residence	Percentage of Respondents Who Were Willing to Leave Fishing for Another Occupation	
	Full-time Fishermen	
1. Isabela area (Basilan)	67	65
2. Tobuan/Sual (Central Luzon)	65	61
3. Bayawan (Negros Oriental)	65	43
4. Salay (Misamis Oriental)	49	20
5. Coron/Tagumpay (Calamian Group)	23	54

Note: The figures are from Baum and Maynard (1976c:9, 39; 1976e:9, 37). Respondents were small-scale, inshore operators.

3.35 In Tobuan/Sual, Baum and Maynard recommended enlarging the area reserved for artisanal fishermen and setting up educational and organizational facilities for them. If enacted, this advice would encourage part-timers to work full-time. Yet the authors' own survey statistics and interview evidence show that small-scale fishing in Tobuan/Sual is unproductive and unprofitable and that a majority of the fishermen feel locked into the activity, regret the lack of a secondary occupation and would welcome the chance to abandon fishing entirely. Rather than treating these attitudes negatively, as an obstacle to the making of full-time professionals, should they not be viewed positively, as an opportunity simultaneously to lessen pressure on a physical resource and to improve the utilization of a human one? A bioanthropological perspective at least raises the question.

3.36 In short, by not necessarily encouraging fishermen to conform more closely to the standard notion of a professional, full-time fisherman, and by differentiating between members of the community depending on what they actually do, have and want, it should be possible to work out policies that balance different constraints and opportunities in an open-ended way.

3.37 Rationality. Since Malinowski, anthropologists have, in effect, urged Western fisheries advisers not to expect substantive rationality across cultures, lest the discovery of its absence in a non-Westerner make him seem irrational. Outsiders should remember that even when full-time fishermen earn more than part-timers, the latter are no less instrumentally rational for trying to maximize goals other than income alone. Just as common property theorists impute to fishermen a collective, resource-based irrationality of overexploitation, so Western observers of apparently underfished stocks may consider individual fishermen irrational for not exploiting the resource enough.

3.38 In language that Baum and Maynard might have used in the Philippines, for example, Elliston (1967:14) wrote of the Melanau barong fishermen of Sarawak that their greatest problem

is that they still have a part-time mentality and have not yet made the transition to full-time professionals. They go to sea less often than their boats permit, they do not stay at sea as long as they could, they do not use the best net practices and the crew varies from 3-5 according to the recent fortune in fishing and who feels like going or not going to sea. Most have other sources of income on land or at sea (i.e., handlining) and are not committed only to their barong.

But why should they be committed only to their boats? Why shouldn't crew size vary in proportion to the likely availability of fish?

3.39 The instrumental rationality of part-time fishing is basically two-fold: to avoid physical risk and assure economic security. Assuming an individual is able to fish, he may nevertheless decide not to because he lacks access (e.g., bad weather), because success is unlikely (e.g., poor catches), or because alternative employment is temporarily more certain or rewarding (e.g., during a labor-demanding phase of agriculture), or for some combination of these among other reasons. Among poor fishermen, occupational pluralism is contingency planning. By combining land and sea resources, people who live in maritime communities gain flexibility; conversely, vulnerability tends to increase with dependence on a single livelihood, especially one as unpredictable as fishing.

3.40 The rationality of risk aversion and security maintenance has antecedents in Western experience. "I have seldom seen an Irishman [who was] exclusively [a] fisherman prosperous for two seasons, without the bit of land to occupy him in boisterous weather and to give his family a more certain prospect of food," observed an Irish fisheries commissioner in 1866, as cited by the anthropologist Löfgren (1978:12). Löfgren himself has shown how, in

Sweden, officials looking to a full-time industrial work force dismissed occupational pluralism among fishermen as irrational "peasant conservatism," even though, when the local economy changed, part-timing paid off, as fishermen who had developed carpentry and other nonfishing skills proved better able to respond to new seasonal demands for labor in logging, sawmilling, and construction. Later, outside developers who tried to introduce deep-sea fishing ran up against what one exasperated commissioner called "the reserved and stubborn personality" of fishermen who refused to innovate (Löfgren 1978:16). But many fishermen, understandably, did not wish to work full-time on a larger, better-equipped boat that would have to be obtained on credit and that would leave its crew members dependent on commercial market conditions which they could not control, to say nothing of the effect of longer absences on family life. And these fears were partly realized when technological change in Sweden's west-coast fisheries, as it would in Perupok many years later, ushered in chronic debt bondage among producers who had to surrender their catches to creditors who also owned the means and sold the fruits of production.

3.41 Once again, such findings suggest that development should, whenever possible, attempt to mitigate the negative effects of ongoing modernization. From an anthropological perspective, Gordon's previously cited image (1954: 132) of fishermen as occupationally immobile, "educationally and often romantically tied to the sea," and lacking "knowledge of conditions or opportunities elsewhere" should be strongly doubted pending evidence to the contrary. And that evidence may become readily available if the scope of fisheries development is expanded to allow attention to opportunities outside of fishing.

3.42 Consider, again, the east-coast Malay villager described by Firth. In 1971, about 40% of a sample of fishermen in this area expressed interest in farming. Five years later, up to 70% were willing to switch to full-time agriculture even if it meant moving away from the villages where they lived (Johnson 1976:6). For in the meantime, the Federal Land Development Authority had opened up opportunities in the interior through which a man could do much better, in terms of security and size of income, than in fishing. That is, developers had raised the opportunity cost of fishing, and fishermen had rearranged their preferences accordingly.

3.43 The constructive assumption of rationality also means recognizing the importance of distribution in fishermen's eyes. Officials who enter a maritime village should be careful not to bring along a productionist bias, for the villagers are likely to be at least as concerned over who gets what as with how much there is to get. Contrary to Anthony Scott's advice (1977: 410), distributive justice should not be treated as an intangible, exogenous variable akin to "love" or "destiny". When fishermen hesitate to accept a proposed technological change they may be expressing an instrumentally rational concern for its effects on distribution.

3.44 A case in point are the fishermen of Cheung Chau in Hong Kong. Despite offers of loans from the government to help them mechanize, they were reluctant to do so--for fear it would cause unemployment (So 1964:144). At

the time, most of the junks in Cheung Chau were owner-operated. One can speculate that owners who did not operate their own junks were more willing to motorize, for they would have been socially most distant from the men an engine might replace. ^{1/} The junk captains may also have worried about the likely future growth of a different kind of mechanized fleet with which they could not compete. The point of these speculations is not to explain the fishermen's reluctance--So's data are too sparse for that--but merely to show that by probing beneath a disinclination to modernize, one can usually find reasons for it that do make social or economic sense.

3.45 More dramatic than the junk captains' reluctance was the burning of government-financed engines, boats and nylon purse seine nets by enraged fishermen in Muncar, East Java, in 1974. What rationally lies behind that? Many different variables could be cited (Emmerson 1975), but most of them are derived from basic local attitudes toward survival and sharing.

3.46 In Muncar, the total annual take of sardines (the mainstay catch) had been declining, off and on, for a decade, and in 1974 it fell to a tonnage lower than any registered in all but one of those years. The new equipment enabled a small fraction of the community (84 out of some 8,000 households) to enjoy the benefits of drastically increased catches valued at higher prices (because with motorization fish could be landed in fresher condition) by the Chinese-owned canning factories to which the catches were mainly sold. In the eyes of the majority of fishermen without access to it, the new technology endangered the resource and threatened their own survival.

3.47 For in order to survive, the community had learned to share. In times of scarcity, sharing became even more important, because it was more obviously a condition of survival. But even in normal times, when catches happened to be poor, the catchers shared them more equally--in a pattern akin to the ones observed by Malinowski and Firth in Melanesia and Polynesia years earlier and confirmed in the Philippines by Baum and Maynard (1976c:25). Sharing of this kind rests not on love or altruism but on self-interest, for a benefit surrendered today by one who has more may be received tomorrow when he has less.

3.48 The 1974-75 sardine season in Muncar was a time of dearth. During this period, when the present author lived in the community, rumors circulated that some of the hardest hit fishermen were selling their furniture: cupboards, chairs, even beds. The truth of the rumor is less important than the shock it evoked in those who heard it and passed it on--shock triggered by the fundamental nature of the items reportedly sold, which signaled that

^{1/} That owning-operating Malay lift-net experts who kept close ties with their crews were, by Firth's account, eager to mechanize is not contradictory, for it will be recalled that mechanization in that case involved a shift to a different and even more labor-absorbing form of fishing. There is probably a technical difference, too, in that junks are harder to motorize than the boats used by east-coast Malays.

survival truly was in jeopardy, and by the "fact" that people would have to sell possessions so basic, which meant that there was no one who would or could, through sharing, help them survive. The individual's and the community's tragedies were indistinguishable; each had become the sign of the other.

3.49 By 1977, when the present author revisited the area, hauls from government-financed, motor-driven purse seine units were being purchased directly by the canneries at an auction hall right on the beach. Women and children of the sort listed in Table 4, whose appropriation of a few fish directly from the boats would have been tolerated (up to a point) in 1974, were being shooed away by auction officials using a loudspeaker. Small-scale dealers of the kind also listed in the table were being told to stay away from the boats because, under the new system, catches could not be purchased outside the action hall. Most of these low-turnover middlemen were unable to bid in the auction because the fish tended to be sold in lots larger than they could afford. And whereas previously payment to the first seller could be deferred until a series of pure credit transactions had finally been consummated by a flow of cash back along the chain to the point of original sale (as in the case Table 4 describes), the new policy was cash on the spot. Bidders unwilling to abide by these rules would not be allowed to take part in the auction. Meanwhile, between 1975 and 1978, a number of fishermen, realizing that they could not compete with or benefit from the government's project, had withdrawn to the south to establish a new fishery of their own.

3.50 Development in Muncar, like modernization in Perupok, increased production but skewed the distribution of income. In Muncar, this was not an inevitable consequence of advanced technology. Had land-based authorities in 1974 been more familiar with how catch value was actually distributed, they could have calculated just who would be helped and who would be hurt by the proposed project, and made plans to accommodate, to the extent possible, the latter group. Instead of introducing a complete and expensive package of brand-new boats, engines and nets to a small number of fishermen, engines alone could have been made available to a larger number, with additional equipment contingent on demonstrating satisfactory use and therefore likely (or actual) repayment of the first loan. Meanwhile, labor-intensive processing operations of the sort that already existed in the community could have been expanded to absorb some of the labor that the project would bypass. Results would have been slower in coming, but the costly setback in 1974 might have been avoided.

3.51 By 1977, in Muncar, the average income of about 600 favored households had roughly quadrupled to around 800 rupiahs (= about \$2) per day--no mean achievement--but the average income of thousands of others in the community remained about what it had been before (200 rupiahs or approximately \$0.50 per day). Because of inflation, the majority may even have become worse off than before. Production increased, but a lack of outlets for it hurt prices; the tonnage of fish sold through the auction in August-October, for example, doubled, but the average sale price was halved. Fishermen talked of collusion between canners and auctioneers to depress the price at which bidding began. Further complicating the coordination of production and

distribution was the lack of cooperation within local government between the fisheries service and various social services (Noertjahyo 1977).

3.52 In this light, it is hard to see a "gambling instinct" (Graham 1943: 86) that encourages fishermen to work for "less than the going wage" (Gordon 1954:132). In common property theory, while they overexploit the resource, fishermen simultaneously exploit themselves, driving down catch per unit of effort until total costs equal or even exceed total revenues. In anthropological reality, fishermen tend not to be gamblers at all--if by that is meant someone who operates alone in hopes of a windfall he can keep all to himself or someone who is so driven to gamble that he is prepared to lose everything. On the contrary, group fishing is widespread and the share system means that windfall gains are enjoyed, albeit in varying degree, by all participants; sharing ensures survival. 1/ For men already near the margin of existence, the case for risk avoidance is compelling. (Cf. J. Scott 1976.)

3.53 It is true that, in the Philippine surveys by Baum and Maynard, several fishermen in Salay voiced a desire to "hit the jackpot" in fishing, a wish not expressed by informants elsewhere. But this finding must be seen in relation to two others: that proportionally more fishermen in Salay than elsewhere (a) thought their living conditions had improved and (b) were (therefore?) satisfied with fishing as an occupation (1976a:29; 1976b:31, 36-37; 1976c:32). Being better off, the men of Salay could better afford to gamble without endangering their own survival. In other words, it made sense for them to want to gamble and for the others not to. If development means commercializing subsistence fishermen by increasing both their overheads and their opportunities through modern technology--promoting an ethic of high-risk-but-high-gain--such attitudes and the reasons for them should prove helpful in predicting the local reception development will get.

3.54 There is another sense in which low-income fishermen in Asian-Pacific countries are not gamblers. Because of modernization, along the

1/ Again, this pattern is not unique to less developed countries, and again Barth's Norwegian herring skippers (1966:6-10) make the point. On the open sea, a high-risk, high-gain strategy dictated, other things being equal, that the skipper strike off on his own, for any school he then discovered could be taken entirely by his own ship. The low-risk, low-gain rule was to join a cluster of other ships in hopes of catching part of a school. From the captain's point of view, the advantage of the second strategy was that if nothing was caught, the blame could be placed on the scarcity or elusiveness of the fish; if the first strategy netted nothing, the crew could blame the skipper for going off on his own. What mattered most to the Norwegian herring fishermen was how they did in relation to the rest of the fleet, and the skipper of course wished to avoid blame and retain respect. These pressures encouraged a kind of sharing of the catch in the act of catching it, albeit not for physical survival but for social reasons. Distributive imperatives do not characterize only the artisanal case.

economically differentiating and demographically concentrating lines noted in detail for Perupok, most poor fishermen do not own the boats on which they crew. And many are tied to a given boat by a debt they owe to its owner, which the owner hopes will not be paid off, because if it were he would no longer be able to use the fisherman's labor. Just such a system prevails in Muncar on boats other than those financed through government loans--that is, on the vast majority of craft. The boat owner is responsible for fixed capital and working capital, depreciation and repairs, and although there is always the possibility of no catch at all, the equalizing of returns from small catches and the opportunity for individual handlining increase the chance that each member of the crew will come home with at least a few fish to show for his effort. The major financial risks are absorbed by those who can better afford to absorb them--owners and creditors. When one of the latter buys an outboard engine to attach to his boat, he is gambling that the increase in his fixed cost will not on the average exceed the expected increase in his variable revenue. By Gordon's own description (1954:132), the ordinary fisherman does not have enough of a "stake" to gamble in this way.

3.55 In short, if fisheries development is to succeed, the instrumental rationality of fishermen, along with their diversity, should be assumed from the start.

2. Issues

3.56 Understanding alone is a necessary but insufficient condition of development success. Making policy means choosing among alternative courses of action (including inaction). Three issues in particular pose critical choices: introducing technology, dealing with middlemen and integrating a project into its environment. Building on previous arguments and evidence, the next three sections will take up these questions in turn.

3.57 Technology. In the early 1950s, the first sonar-equipped ship in Norway, the fishing research vessel G. O. Sars, guided the nation's herring fleet out to meet the incoming shoals hundreds of miles farther out and many days earlier than had been possible before. In "one fell swoop," a single innovation repaid Norway for her entire investment in marine research to that date, and the exploits of the G. O. Sars became an "almost classic example" of pure technical success. "We would be fully justified," concluded a marine engineer in Sri Lanka in the mid-1960s, "in expecting comparable results here" (Kvaran 1964:310). Yet, in Norway, if fishermen had not had the skills to use the new technology effectively or the organizational leverage to benefit from it, and if the economy had not been able to handle the increased yields--all problematic conditions in Sri Lanka in the 1960s--the G. O. Sars would not have succeeded.

3.58 In Indonesia, first the Dutch and later the independent Republic conducted experiments using research vessels to determine the utility of motorized and trawl fishing compared with traditional methods (Krisnandhi 1969:56-57). The more mechanized techniques did indeed substantially raise returns to capital and labor. But because the experiments focused narrowly on the methodology of the catch--ignoring training, licensing, repairs, spare

parts, processing, storage, credit and marketing, without which experimentally achieved economies of scale could not be generalized--they encouraged overconfidence.

3.59 By the 1960s and 1970s, it was clear in Indonesia that innovation in a vacuum would not work. On the input side, by the mid-1960s, nearly half of all the motorized boats in the country were completely out of commission, and those that were seaworthy were spending more than half of their time unproductively--mainly for a lack of spare parts and ice and an excess of red tape. On the output side, without adequate processing and marketing outlets, higher yields achieved by making fishing more efficient often glutted local markets, depressing ex-boat prices. Between 1951 and 1967, while the number of motorized fishing craft increased more than thirty-fold, the productivity of Indonesia's fishing fleet, per boat and per man, declined by a third and a fifth, respectively (Krisnandhi 1969:51-53).

3.60 Elsewhere in Asia, too, examples of the premature introduction of advanced technology abound. Early efforts to trawl the fertile Wadge Bank off Sri Lanka were bankrupted by overproduction; market outlets for the increased catches could not be found (Mendis 1964:268). Also in Sri Lanka, early loan schemes to enable fishermen to purchase mechanized boats did not provide for adequate maintenance or administration to ensure repayment; many new vessels were wrecked, some permanently, for lack of separate mooring facilities, and for the same reason motorized crews had to operate in close proximity to traditional beach seine fishermen, which caused tension between the two (Kvaran 1964:309-310).

3.61 In Kerala, India, before World War II, a government-sponsored project to set up a commercial offshore fishery using large vessels was abandoned for lack of trained crewmen and facilities for docking and repair (India 1962:84). Later, on the east coast, efforts by the West Bengal Government to develop a deep-sea trawl fishery in the Bay of Bengal, which absorbed nearly 40% of that state's budget for fisheries development in 1951-56, failed because of the high cost of importing foreign vessels and foreign crews and maintaining them, and because no parallel efforts were made to provide canning or refrigerating facilities or to improve transport to Calcutta and other markets (Bhattacharyya 1965?:38, 41; Saha 1970:57, 60, 114). In Malaysia, when purse seines were first introduced into Sarawak, the catch glutted the Kuching market; low prices and high overheads discouraged the innovators and they gave up the effort (Elliston 1967:22). The wreckage of hardware-centered development in Muncar has already been mentioned.

3.62 From these failures, three broad lessons can be drawn. The choice of technology and the manner of its introduction should meet these criteria: the equipment or technique should be appropriate, its use should be coordinated with the conditions necessary for its success, and the community should feel responsible for it.

3.63 While planning a fisheries development project, and even more during its implementation, "whether" and "why" questions are difficult to ask. An ostensibly more practical concern over "how" and "when" tends to elbow

them off the agenda. If the unasked questions are about technology, project goals can be badly damaged, as the above examples show. Typically, a project is meant to impart technique, in the form of hardware or software or both. To seriously consider not delivering technology is to entertain the prospect of not having a project, and many developers are too activist for that. Yet an initial question worth asking is what would happen if no planned change were made.

3.64 Because it requires extrapolating into the future, this query will drive planners constructively into a maritime community's past: What has previously unplanned change--modernization--accomplished? Technical experts may claim that the question is unanswerable in the absence of a reliable statistical record, but that may simply reflect their trained distrust of qualitative or "anecdotal" evidence. For an anthropologist, every villager is a potential informant. Older persons should prove especially rich sources of information on the circumstances and results of previous technological change. Such a historical outlook can be an invigorating defense against preconceptions and misperceptions. Conversely, the more tenaciously outsiders imagine the community to be isolated, backward, or maladapted, the more they will tend to discount its past as unworthy of study and to exaggerate the originality of their own proposals.

3.65 Specifically, it will help to know who introduced a previous change and why. Objective causes and subjective reasons should be distinguished. Often, innovation spreads not through material incentives alone but outward from a handful of entrepreneurs along networks of social respect. If the cores and peripheries of such webs can be identified, they may prove valuable in adapting and sustaining any future change.

3.66 Innovations are also rarely unopposed by at least some members of the community in which they occur. What arguments or emotions were leveled against the previous change, and why? Was it introduced by a racial, religious or wealthy minority? Did that matter? What opposition is likely to meet the contemplated future change? Toward achieving what indigenous goals will that opposition be rationally instrumental? Should those goals be accommodated by the project and, if so, how? This line of inquiry is likely to place the matter of development's distributive effects in the forefront of concern: who gained by a previous change, who lost, and whether and how future losers should be compensated. Note also how these questions can ensure that the task of development is defined at least in part as community assistance, rather than as resource management alone.

3.67 Obviously, the choice of technology should also reflect its physical and economic "fit" with the resource. The failure of the first modern prawn fishery in Sarawak illustrates the importance of both biological and financial criteria. A trawler was purchased and a freezing plant built to receive its hauls, but the imported dragnet was ill-suited to the local sea-floor, and the high cost of consequently unused refrigerating capacity ended the venture. A government-subsidized cannery in Estancia in the Philippines in the 1930s suffered a similar fate (Szanton 1971:32).

3.68 In some cases, physical success may accompany economic failure. (That the converse is not true re-emphasizes the primary importance of marine ecology.) In the Philippines, for example, the first mechanized purse seiner was introduced in 1951. Christened the Queen Mary, though it was only a motorized dugout canoe, the boat caught five times more fish on the average (by weight) than its unequipped sisters. But the expense of maintaining and repairing the big cotton net made the venture unprofitable, and it was not reattempted (Dinglasan 1960-1970:126).

3.69 When profitability is not a high priority, employment probably is. Typically, other things being equal, mechanization increases physical output by weight per boat at the cost of reduced labor need. 1/ Will the project try to accommodate the labor it displaces? An early inventory of possible job opportunities that could be created or expanded, inside but also outside the fishery, can help make project personnel aware of this problem from the start; a typical list might include preserving and processing facilities, provision and repair shops, transportation and marketing services, dock and breakwater construction, and nonfishing employment in infrastructural building and repair, handicrafts and light industry, and agriculture-related activities.

3.70 How appropriate is it to provide people with training vs. things? Too often the prestige and tangibility of modern hardware are allowed to preclude attention to the possibility that a lack of skills, including non-fishing skills, may explain local poverty far better than a lack of equipment. Opinions, in turn, differ on the merits of formal vs. on-the-job training. De Silva (1964:258, 264) has associated the spectacular fishing success of the Japanese with their having established a fishery school as early as 1895, three years before they acquired their first steam-powered fishing vessel. (By the 1960s, Japan had over a hundred fisheries training or research institutions and ships.) Likewise, according to Koh (1973:2369), formal training helped make South Korea a major fishing power in the Pacific.

3.71 On the other hand, noting how rapidly Thai trawl fishing grew in the absence of sophisticated training, Tiews (1973:285) would discourage investing in costly educational facilities that may graduate unneeded experts. Only half of the first class of skippers to pass through the multimillion-dollar Fishermen's Training Institute in Penang, for example, took jobs in fishing, apparently because the existing quality of hardware in Malaysian

1/ In Kerala, motorized 22-foot boats were found to catch on the average 60% more by weight per boat than unmechanized boats of the same size, and for 25-foot boats the figure rose to 110% (India 1962:87). But motorizing the nearby Laccadive Islanders' traditional pole-and-line boat made four members--30%--of the standard 13-man crew redundant (George 1973:2176-2177). Note that as the actual organization of fishing changes from a traditional type to a different, mechanized type, labor demand per producing unit may, at least initially, increase--as in the shift from lift-net to purse seine units in Perupok.

fisheries was not up to their specialized skills (Anonymous 1975:21). But whether Malaysia's economy scored a net gain or loss depends on what these former students went on to do. As for Thailand, its technical success was a bioeconomic failure, for it led to overcapitalization and overfishing. And the Japanese/Korean experience is probably unique.

3.72 As usual, a host of variables are involved. Nevertheless, mounting evidence of damage done through overattention to hardware, including the examples cited earlier, suggests that the premature introduction of machinery may in the long run prove more unwise than the premature establishment of training and research facilities, if the latter are constructively biased, along lines described earlier, toward an "intermediate methodology" of applied science. Project authorities should also consider responding to the previously argued rationality of occupational pluralism by expanding local training beyond marine fishing techniques to include carpentry and other handicrafts, small vehicle and appliance repair, techniques of agriculture, perhaps even elementary business administration, among other skills.

3.73 Even if proposed technology is appropriate in these senses, it must be coordinated with the conditions necessary for broader success. The Indonesian, Sri Lankan, Indian, Malaysian and Philippine cases just cited, all support this point. Repairing, docking, icing, canning, shipping, marketing, financing, training--unless some combination of these and other activities is taken into account, the technical satisfaction of helping men catch more fish will be swamped by larger disappointments. 1/ (This issue of integration will be taken up again below.)

3.74 Last but not least, and often overlooked, is the criterion of responsibility. The more responsible maritime villagers themselves feel for making an innovation succeed, the more likely it will. This is another reason to link a project to diverse local needs, webs of social respect, and above all to questions of distributive justice that may be uppermost in villagers' minds.

3.75 Reconsider, for instance, the matter of collateral. Repayment for, and productive use of, new gear will be more likely if its recipients'

1/ Applicable to many of the cases reviewed above is this comment about a Malaysian scheme to equip artisanal fishermen with modern gear: that it showed what could happen "when a single input is applied to artisanal fisheries without sufficient pre-investment study and without providing the necessary supporting inputs in the form of adequate training, extension advice and supervision and marketing" (Lawson 1975:25). Nor is coordination a problem limited to Asia. In a Ghanaian parallel to the Bengali failure cited earlier, trawlers were imported before shore facilities could be adequately developed and the resulting glut of herring could not be unloaded for lack of storage, an imbalance compounded by the expense of maintaining the vessels and their foreign crews (Adjetey 1973:2466-2467).

reputations are at stake. In Indonesia, many maritime villagers join rotating credit associations, paying in a fixed amount each week or month in hopes of drawing (at random) an early right to "receive the pot." (See Geertz 1962.) Because this amount is eventually equaled by the recipient's regular payments, neither interest nor prolonged debt is involved. Sometimes the sum thus acquired is used to purchase or repair productive equipment. In a given community, knowing who manages and belongs to the most successful among these associations can be helpful if technology is to be introduced through honest, respected and savings-oriented members of the community.

3.76 Public responsibility also means open and responsive project management. It is tempting to build a figurative wall around a newly organized government cooperative to protect it from the pressures of favor seeking and sheer need that nonmembers may exert. The temptation should be resisted. Festivals and other public occasions, for example, should be used to demonstrate the cooperative's loyalty to the community. More important, the performance of coop members using financed equipment, including their repayment rates, should as far as possible be a matter of public record, to encourage the community-regarding idea that if a loan beneficiary proves consistently unproductive without good reason, his equipment will be reallocated to a more deserving fisherman.

3.77 In this connection, kinship is a double-edged sword. Nepotism in management can destroy a project by opposing it to the community's broader interest. Family ties as obligations to save collective face, on the other hand, can help ensure the effective use of gear entrusted to kindred crews. There is, again, no substitute for an ethnographic understanding of these potentials before a project's beneficiaries are selected.

3.78 In sum, attention to the contexts as well as the contents of proposed technological change will raise the likelihood that the mentifacts or artifacts to be introduced, and the manner of their transmission, will be appropriate, coordinated and accountable--in short, successful.

3.79 Middlemen. Crucial to the success of a context-sensitive approach to artisanal fishery development are the problems and opportunities posed by middlemen. Officials wishing to balance off the interest of producers in high prices against that of consumers in low ones can learn much from the experience of people accustomed to operating "in the middle" between the two. A cooperative that ignores middlemen is that much more likely to fail. Not only does existing technology need to be understood in socioeconomic context at an early stage of project planning; so do middlemen.

3.80 The need is not well served by the hostile attitude held by many officials and fishery authorities. Middlemen in India have been characterized as "a chain of parasites" (Saha 1970:102) who exert a "stranglehold" (Bhattacharyya 1965?:v) over the fishermen they are said to exploit. In Sri Lanka, "the normally accepted view is that traders are parasites, living off and exploiting the impoverished peasants" who are "the real producers of wealth in the economy" (Stirrat 1973:189-190). Indonesian provincial and

district officials' opinions of the middlemen in Muncar's fish trade in 1974-75 were no less jaundiced (Emmerson 1975). In the writing of some observers, an extremely negative image of middlemen is reinforced by contrast to an idealistic view of producers. 1/

3.81 These images have strong policy implications, for they allow those who hold them to argue for government intervention to set up cooperatives to bypass the villain and protect his victim. For Bhattacharyya (1965?:viii-ix), in India, "To eliminate middlemen and enable the toilers of water to get the maximum benefit, cooperation of fishermen is the only answer." In Sri Lanka, cooperatives have been encouraged as a means "to break the power of the traders" (Stirrat 1973:200). Muncar's protocooperative, too, was meant to defeat that community's go-betweens. Generalizing from Thai data, Western experts (FAO 1949:48-49) endorsed the organization of middlemen-ousting auctions and cooperatives as necessary phases in fisheries development everywhere.

3.82 In retrospect, in some of the earliest complaints against middlemen, one can already glimpse the reasons why so many of these dealer-bypassing moves would fail. In 1900, the Sarawak Gazette reported that a "ring" of fish dealers had conspired to fix buying and selling prices in the Kuching market, but went on to note that these traders supplied capital to fishermen at no interest and great risk (Elliston 1967:39). Only a decade later, a civil servant in British India concluded his report on the fisheries of East Bengal and Assam by lamenting his lack of success in organizing cooperatives among fishermen, whose profits were "largely swallowed up" by middlemen and owners. "This is a very difficult task," he wrote, "as the fishermen are very ignorant and conservative and the middlemen are only the more prosperous men of the same castes, who wield enormous influence over

1/ As in the eyes of the Indian fisheries expert who wrote that the fishermen of West Bengal had been consigned to

an abyss of hell due to unscrupulous and feudalistic exploitation by a section of middlemen and capitalists who have brought about ruination and almost complete extinction of [the fishing] community The most heartening feature is that these [fishermen], even amidst such a catastrophe, have still in them a golden heart, honesty and integrity, valour and patriotism and a social spirit [of] which the nation can really be proud (Saha 1970:100).

A similarly Manichean contrast marks off the evil dealer from the good-hearted but gullible fishermen in Vilis Lacis' novel of Latvian fishing life in the 1930s (Lacis 1954). More nuanced and probably closer to an actual villager's eye view is the portrait of the middleman in Thakazhi Sivasankara Pillai's interpretation of life in a Kerala fishing village (Sivasankara Pillai 1962). Bias against moneylenders has, of course, long been expressed in Anglo-Saxon literature, witness Shakespeare's eponymous Shylock.

their brethren" (De 1910:77). The added italics suggest that the staying power of middlemen may be attributable less to the "reserved and stubborn" personalities of their fishermen clients than to certain concrete advantages enjoyed by the latter in a potentially close relationship.

3.83 Like the idea of a "fisherman," the notion of a "middleman" must be specified in context if it is to be useful for policy. And again, the term conceals tremendous variation. In Muncar, for example, depending on which of various, and usually only implicit, usages in the literature one adopts, three of the ten different value-sharing roles shown in Table 4 could be ascribed to middlemen. Often in Muncar--apart from the government-equipped purse seine units--a boat owner (juragan darat or lord of the land) is a middleman between the crew and the financier, lending to his boatmen money he has borrowed from the financier and thus binding the men to work for him, just as he is bound by his own debt to see that every catch is turned over to the financier for sale. The financier (pengambek or one who ties) is a middleman who "ties" the boat owner to him by loaning money for the purchase of the hull and gear and for "tying" the crew; the financier then operates in the middle between the crew, from whom he receives each catch, and the dealer to whom he sells it. The dealer (blantik or broker) is often spoken of in Muncar as someone "whose only capital is his mouth," for, lacking the financier's financial resources and guaranteed supply, he must rely on his skill in oral bargaining to buy low and sell high.

3.84 As can also be seen from Table 4, the return to each of these kinds of middleman varies greatly. So does the middleman's sex. Throughout the world, almost all who actually fish in the sea are men, but in many developing countries those who serve as intermediaries in the resulting trade are women (Pollnac 1976:51-52).

3.85 Broadly speaking, in any given fishery, someone who is loosely called a middleman may be male or female and may regularly perform one or more of seven different functions. The four most common and socioeconomically important are: (1) ownership, (2) financing, (3) wholesaling and (4) transportation. In Muncar, for example, the juragan darat does 1 and 2; the pengambek does 2, 3 and 4; and the blantik does 3 and 4. Middlemen may also in some circumstances do one or more of three additional things: (5) processing, (6) retailing and (7) fishing itself. In Muncar in 1975, low-turnover female blantiks who were unable to resell their small purchases right away might spread the fish out on the grass to dry in the sun, hoping to retard spoilage to enhance the chance of a later sale. (This option has since been eliminated by the government as unsightly and unhygienic.) The same fish dealer in Sarawak may finance local drift-net fishermen, process successive catches from a stationary lift-net, own gear of various kinds and sell supplies to fishermen from his sundry goods shop (Elliston 1967:37). In Perupok, during Firth's first visit, two of the three types of seagoing middlemen he described (see Part II) were expected to help haul up the catch.

3.86 With regard to the monolithic and frequently derogatory notion of a "middleman," then, disaggregation is the beginning of realism. When a development project is planned and the option of "bypassing the middleman"

arises, the different functions performed by these men and women should be identified and subjected to the following question: Under existing circumstances, what would happen, and to whom, if this particular function were not performed by the middleman? Using such a guideline, it should be possible to separate out aspects of the middleman's role that are more and less constructive. And if there are constructive functions that the government itself is unwilling or unable to take over, and which in the absence of middlemen are unlikely to be performed at all, then officials should--temporarily, at least--enlist local intermediaries rather than alienating them.

3.87 If diversity is a constructive expectation about middlemen, there is benefit too in considering whether the acquiescence of those whom they exploit may be instrumentally rational. A South Asian case will serve to illustrate this point.

3.88 In Sri Lanka, according to Stirrat (1973:196-201), fishermen agree with a mudalali (middleman) ^{1/} to go to a seasonal fishing camp and sell all they catch there to him at a price fixed beforehand. Once this agreement is reached, the mudalali makes an advance payment to the fishermen he has thus managed to "tie". On the agreed day, the fishermen are transported to the camp. There, for the length of the season, the men surrender whatever they capture to the mudalali. Records of this accumulating credit are kept. The mudalali, in turn, supplies the fishermen with raw food, cooking fuel, drink and cash. Records of these debts are also kept. At the end of the season, these accounts, including the amount of the advance, are settled. Normally, the mudalali owes and pays money to the fishermen, but sometimes the fishermen are in debt. In the latter event, if they are unable to pay off the debt, the fishermen may agree to continue the relationship through another year, with the amount owed to be taken into account when the initial advance is made the next time around. Such relationships can endure for years.

3.89 According to Stirrat (:200, 206, n. 15), the view generally accepted by fisheries inspectors, members of parliament, and the general public in Sri Lanka is that fishermen are driven into these relationships for lack of capital, that this forces them to take advances from the mudalali to buy gear and that this debt puts them at the mercy of the mudalali who can impose fixed, below-market prices that in turn worsen the fishermen's position, making them even more indebted to, and exploited by, the middleman. Development, in this view, must break this downward spiral.

3,90 "It is undoubtedly true," writes Stirrat (:200), "that the mudalalis and other fish traders do exploit the fishermen and appropriate surplus value." But the system does not inevitably impoverish the fishermen, nor does it flourish because of the lack of capital among them. The advance

1/ Mudalali is translated, for Sri Lanka, as "trader" by Stirrat (1973:194) and as "middleman" by Alexander (1975:339), and, for Kerala, as (literally) "owner" by Narayana Menon (Sivasankara Pillai 1962:3)--more evidence for the diversity and flexibility of brokerage roles.

allows those who receive it to purchase gear with which they can produce income to help pay off the advance. The fishing camps also enforce saving. Being isolated, they offer few opportunities to spend money. Most fishermen expect to, and usually do, return to their homes at the end of the season with a substantial sum. What is more, about half the fishermen do not use the advance to buy gear at all; instead they invest it in jewelry, gold, housing or land, or they save it. Precisely those fishermen who have the least equipment and who need capital the most are least likely to go to the camp, for lack of a mudalali willing to sign them on.

3.91 It is in this light that the advance should be viewed. Whereas an outsider might think it binds the fishermen to the mudalali, in the fishermen's eyes the reverse also occurs: by binding a mudalali to them, it frees them from the risks of distributing their catches, for the relationship passes these entirely to the mudalali. Both parties benefit. The fishermen want and get a guaranteed long-term outlet for their production. The mudalali wants and acquires a guaranteed supply. Fishermen carefully compare mudalalis before entering into an agreement with one; they prefer larger-scale traders, for example, on the grounds that these men must be more skilled and less vulnerable to bankruptcy by market fluctuations.

3.92 As for the fixed price for fish in the camps, it is indeed probably substantially below the comparable market price, even taking into account the cost of transportation incurred by the trader. But the important advantage for the fishermen is that, in Stirrat's words (:202), "they are secure. No matter if there are floods, or the ice runs out, no matter if the mudalali fails altogether to dispose of the fish, the fisherman still gets his proceeds."

3.93 Lastly, the fisherman-trader relationship is social, not just economic. "For the fishermen, a large advance, far from being a shameful sign of impoverishment, is a status symbol, an acknowledgement of his skill" (:204), and in his eyes, a "good" mudalali is one who is willing to set up a long-run social relationship and not merely abide by its formally economic content. Paying off one's debt in such circumstances, far from demonstrating commendable industry or thrift, is a personal insult. 1/ The mudalali, in turn, must continually balance off his need for "good" (productive, loyal) fishermen, whom he could attract by cultivating social relationships with them (helping them out financially in times of personal crisis, for example), and his need to make a profit and stay in business.

3.94 Stirrat was careful not to generalize beyond his case, but an intensive study by another anthropologist, Alexander (1975), conducted not in the fishing camps but in fishing villages, reached similar conclusions. Alexander found that the more successful fishermen could, if they wished to, operate their craft without benefit of a sales-tying, interest-free advance

1/ In Sivasankara Pillai (1962), for example, the repayment of a debt to a mudalali signals not liberation but death.

from a mudalali at all. Yet they sought to initiate and maintain the relationship. Aside from eliminating their marketing risks and bringing in needed credit and outright gifts, the system gave them a bargaining counter: the threat of repudiating the debt altogether. Alexander also observed, as did Stirrat, that the mudalalis tended to come from fishing stock, and that the resulting patron-client tie reflected deeper ties of shared caste, residence, kinship and custom (1975:340). That is just what De, in his report on East Bengal fisheries (cited above), had alluded to 65 years earlier in noting that the middlemen were only the more prosperous members of the fishermen's own castes. The government, by comparison, must have seemed then, and still appear to be, a distant entity unwilling to extend interest-free credit or to accept full marketing risk.

3.95 To reiterate, for many poor fishermen, security may be a higher priority goal than capital. Development efforts intended to help the "absolute poor," those with "basic human needs," should cater to the first as well as the second objective.

3.96 Nevertheless, although it certainly corresponds to evidence and arguments presented earlier in this paper, the Stirrat-Alexander image of risk-averting, security-conscious fishermen should not be allowed to replace the stereotype of economic man with another one of social man, nor the spectacle of ruthless broker-producer exploitation with one of equal benefit. To assume instrumental rationality, with security as its prime aim, is not to deny that a shift toward higher income as a goal might result in improved material welfare. The difficulty is that in order to make such a change in orientation permanently beneficial, development personnel must somehow reduce the fisherman's risk without making him so dependent on the project that when it ends he is left worse off than before. This is a main promise of contextual development, not in the sense of a vertically integrated project that roots its beneficiary more deeply in full-time fishing, making him more vulnerable to the vagaries and exhaustibility of the resource and more beholden to project organizers who may lack a long-term commitment to his community's future, but in the sense of a more horizontally integrated effort to help the fisherman respond to a shifting mixture of opportunities inside and outside the fishery, using new and improved skills and other resources that can become an autonomous, long-run guarantee of his security.

3.97 In the next section, more will be said of this issue. Meanwhile, more needs to be said of the need to assume diversity among middleman-client dyads. Stirrat and Alexander, for example, studied fishermen on Sri Lanka's south-central coasts; both writers noted that relations between middlemen and fishermen elsewhere on the island were less close. A detailed survey of seven fishing villages in Kerala revealed significant differences in the shares of catch value accruing to labor, capital, and charity (Economic Research Council, Kerala 1959). Nor is the single distributive event in Muncar displayed in Table 4 exactly typical of coastal villages generally in Indonesia, in East Java, nor even in Muncar's own district of Banyuwangi.

3.98. Just as middleman-client linkages vary, requiring comparison within and across communities, so do the chains of sale and resale that link middlemen to each other. The presumed rapacity of middlemen should be tested by determining what advantages actually accrue to all the main links in fish marketing chains, from initial capture to final consumption. Again, the mudalalis will show what such an exercise can achieve.

3.99 According to Table 6, a higher proportion of the retail price of fish in Sri Lanka accrues to the mudalali than to his counterpart in a Western economy. Although the data were obtained in the mid-1960s, the difference may have narrowed somewhat since, but there is no reason to believe it has disappeared. Also in Table 6, in Sri Lanka, the percentage of the retail price used by wholesalers and retailers to cover their costs is much less than the percentage absorbed by them as profits; in the UK, it is much more. Marketing chains in the former case might be termed profit-intensive, in the latter cost-intensive. Although information on this point is not available, this difference is probably in no small measure related to lower turnovers in Sri Lanka and higher ones in the UK, which may in turn reflect a greater density of Sri Lankan wholesalers and retailers and greater uncertainty among them regarding the supply of fish.

Table 6: RETURNS TO MIDDLEMEN IN SRI LANKA AND THE UNITED KINGDOM
AS A PERCENTAGE OF THE RETAIL PRICE OF FISH

Country	Role	Costs	Profits	Totals
		------(%)-----		
Sri Lanka	1. Producer (fisherman)	n.a.	n.a.	41.4
	2. Coastal wholesaler (beach mudalali)	3.0	5.5	8.5
	3. Inland wholesaler (mudalali at St. John's market in Colombo)	13.5	23.9	37.4
	4. Retailer (fish monger)	2.7	10.0	12.7
				100.0 =====
United Kingdom	1. Producer (fisherman)	n.a.	n.a.	52.5
	2. Coastal wholesaler	15.5	0.9	16.4
	3. Inland wholesaler	6.3	0.7	7.0
	4. Retailer (fish monger)	21.1	3.0	24.1
				100.0 =====

Note: The figures are from de Silva (1964:262); n.a. = not available.

3.100 In other words, assuming that Sri Lankan middlemen are prudent rather than simply greedy, the more of them there are for a given quantity of fish and the less sure they are of getting fish tomorrow, the more necessary it will seem to them to maximize profits today. If these assumptions are true--and they could be tested easily enough in the field--then it would be wrong to try to cut down the high profit margins of, say, the Colombo mudalalis without trying at the same time to reduce the risks that make those high margins appropriate. And if the government takes over St. John's market, replacing the inland mudalalis altogether, what guarantee is there that the new management will not simply raise its overheads? That is, even though the government may earn proportionally less in profits from St. John's than the mudalalis did, these "savings" may be eaten up by increased expenses--leaving the producer's proportional return about where it was before.

3.101 Table 6 works from the point of retail sale back toward the beach. Accordingly, the calculation fades out at the producing end. Fishermen are not disaggregated by role, nor are their costs and profits distinguished. Table 4 starts at the beach and works inland, which is why its utility fades at the point where the fish are processed; missing is information on retail prices and the shares of their value that cover costs and provide profits for wholesalers and retailers outside Muncar. In principle, with a team of researchers, it should be possible in any given instance to complete the chain and even to extend it to the point of actual capture to include any sales made at sea. Even without a complete chain, by starting from both ends and working toward the middle, useful information could be generated and important questions raised.

3.102 In the UK, for instance, the percentage distributions of costs, profits and total returns seem to be more or less U-shaped; inland and coastal wholesalers probably take less of the retail price and have fewer costs and smaller profits than retailers or producers. The corresponding distributions in Sri Lanka appear to be more jagged; percentage returns to coastal wholesalers and retailers are probably lower than those to inland wholesalers and producers. Table 6 says nothing about absolute returns, returns as a proportion of total income or the opportunity costs of participating in the marketing chain. But even a fragmentary pattern can point to policy propositions worth further investigation. In Sri Lanka, for example, Table 6 raises the possibility that efforts to bypass the beach mudalali may disrupt fish marketing, increasing risks to the wholesaler in Colombo and providing him with an incentive to raise his prices and already considerable profits even higher in order to compensate for increased uncertainty in the source of supply. In any event, the beach mudalali's costs and profits do not appear to be excessive; his total share is the lowest in the chain. A more appropriate point of reformist entry into the system would appear to lie in the capital city, where an attempt could be made to rationalize St. John's market in order to reduce the high costs and profits being realized there and to shift the value thus "saved" back toward the producer.

3.103 In this way, though with much more information, preferred policy access points in marketing systems could be selected for any country or region. In West Bengal, for example, the marketing chain appears to form

a roughly inverted U that peaks in the urban inland market. That is, the aratdar (wholesalers) in Calcutta control the fish trade from the apex of a chain of commissions and credit that runs down to the purchasing agents on the beach and down along the other leg of the inverted U to the retailers in Calcutta's markets (Saha 1970:63ff.; Bhattacharyya 1965?:29-30). Similarly, the wholesalers and brokers who run the "whispered bid" auction at Navotas in Manila may be the keystone in the Philippines' marketing arch (Manacop 1955:165; World Bank 1973: Annex 14, pp. 2-3).

3.104 A contextual approach to fishery development would estimate the repercussions along the marketing chain, in both directions, most likely to ensue from officials' trying to alter one or more of its links. Failure to do this doomed an attempt by the West Bengal Government to impose a ceiling on retail fish prices in Calcutta in 1963 (Saha 1970:70-71). In reply, the aratdars vacated downtown fish markets and set up their own black market on the outskirts of the city. Some retailers left their stalls and began making home deliveries of fish at very high rates to the wealthier neighborhoods. Retailers who stayed in place took advantage of the aratdar-created scarcity to include heads, tails, viscera and stale fish in the units of weight to be sold, thus keeping under the ceiling in only a technical sense. Twice the government raised the ceiling in hopes of mollifying the traders and reducing their opposition, but to no avail. In the end, in 1966, the government admitted defeat, abrogated the ceiling and allowed matters to revert pretty much to their previous state.

3.105 To review the argument: potential roles for brokers in fisheries development projects should be seen to range from ally to enemy, with many variations in between. Parasitic greed should no more be attributed to "middlemen" than stubborn conservatism or suffering virtue should be ascribed to "fishermen," and both roles should be disaggregated to reveal the variety these uniform labels conceal. Marketing chains should also be investigated: to determine what margins of profit for what services characterize which links, to identify "excessive" earnings, to tailor proposed reforms to the circumstances of "overrewarded" links, and ultimately to shift the excess toward other links (including producers but also, for example, porters of the sort listed in Table 4) in order to increase their productivity or reduce their poverty or both.

3.106 Finally, the fisherman's need for security and the middleman's willingness to accept risk should make project managers cautious about helping to commercialize a small-scale fishery where subsistence, i.e., survival, is of paramount concern. For unmediated dependence on market forces will raise risks to fishermen in the absence of customary lender-buyers. And if project officials decide to replace the latter, shouldering the risk themselves, they should be aware that they may be substituting one dependence for another, and that local middlemen may be correctly seen by fishermen as more trustworthy and reliable in the long run than any outside authority.

3.107 Integration. As noted, officials in Calcutta in the mid-1960s were defeated by their inability to control where and how fish were sold. Nor did they control the supply. They were also thwarted by the willingness

of consumers to pay higher prices even for lower quality fish. A policy meant to help Calcutta's poor wound up hurting them.

3.108 This painful lesson in distribution is the obverse of the lesson learned by governments that have tried, through technology, to increase production alone. But if the moral is that development efforts must be vertically integrated, encompassing catchers and consumers and everything in between, then what of the lesson of Muncar? Their failure stemmed not from a lack of vertical integration (though indeed none was planned in 1974) but a lack of horizontal integration: the selection of only a handful of beneficiaries threatened the vast, empty-handed majority. Yet one cannot expect resource-short governments preoccupied with many other problems to plan and execute fishery projects that are both vertically and horizontally integrated in the fullest sense.

3.109 Marr (1973:2319) would place the priority on vertical integration in order to reduce the need to shield artisanal fisheries from commercial competition. But timing is important, too. Attention to horizontal integration between a small pilot project and the community in which it is being undertaken is probably of greatest importance at the very outset. The more successful the project is in increasing production, the more urgent vertical integration will become lest ex-boat fish prices and returns to labor fall for lack of processing facilities and marketing outlets. When vertical integration is achieved, the issue of horizontal integration may arise again, for by then development may have split the community into benefiting and bypassed groups. (A good illustration is the Indo-Norwegian project in Kerala [Klausen 1968].)

3.110 Whatever the rhythm of development in a given case, host governments and foreign benefactors should not adopt a priori positions on the matter but should continually reconsider the trade-offs between the two policy priorities. Much will depend on actual conditions in the community, which must be observed with care in advance and over the life of the project. In Muncar in 1974, marketing chains were locally centered. Beach dealers were not, by and large, agents of, nor indebted to, larger dealers in the provincial capital. The biggest combined owner-financier-dealer in the trade was a man long resident in the community itself. The project, when it came, enabled a few local fishermen to buy their way out of long-standing debt relationships with this middleman and the other men like him in the community. Not surprisingly, these men were angered, and they almost certainly fostered the ensuing violence. In Muncar--with the cheap clarity of hindsight, to be sure--the priority should have been on integrating the project horizontally with the rest of a community whose more influential members it was otherwise likely to antagonize.

3.111 The priority of Sri Lanka and West Bengal, where marketing chains appear to be capital-city centered, should probably fall more on vertical integration lest value created by technological improvements at sea be siphoned off by inland mudalalis and aratdars. But these are matters of degree. Every development project should be more or less diagonally integrated, and the gradient should change over time in response to changing

conditions. The point is that once decision makers know the socioeconomic structure of any given fishing system and the way in which both catch value and retail value are shared among participants in production and distribution, the optimal policy for the system's development, in relation to scarce resources and their alternative uses, can be determined.

3.112 Integrated fisheries development has become at least as popular among policymakers as its counterpart, whole-system analysis, has proven among scientists. At a major international gathering on marine resource management sponsored by FAO in 1972, for example, time and again speakers favored such an approach. 1/ The conference itself advocated a "biosocio-economic" perspective on the grounds that "the integrated approach in all fields--exploration, research, training, boat building, marketing and extension--has been rewarding" (Technical Conference 1973:2040, 2344).

3.113 The difficulty with this formulation is, paradoxically, that it is too broad, in not specifying priorities, and too narrow, in ignoring horizontal integration. FAO's biosocioeconomic outlook is basically what Sir Frederick Nicholson regretted, 55 years earlier, not having adopted in Madras (see frontispiece). Merely adding socioeconomics to biology, however, does not solve the decision-maker's problem of assigning priorities to different goals. On the contrary, it complicates policy choice and research by multiplying the alternatives and increasing the number of potentially causal variables; it may even undermine development by fostering the belief (contrary to Hardin, also on the frontispiece) that more than one variable can be maximized at a time.

3.114 On the other hand, as defined by the FAO delegates and generally understood by other aid and development agencies, integrated fisheries development is vertical not horizontal. Between fish and people, vertical integration can be seen as an effort to be more comprehensive about the commodity, from its origin in the biomass to its final destination on land. Laws and limits to ensure possession and conservation; equipment and training to improve capture; docking, icing and canning facilities to enable processing and add value; market reforms to raise wholesale and lower retail prices; research on all of these things Vertically integrated development seeks, in effect, to correct a previous overemphasis on productive technology by tracking fish earlier and keeping them in focus longer as they move from biological through economic stages to consumption.

3.115 The danger of overcorrection is real. Consider the tension between scope and control. Typically, the reason for extending the range of relevant factors farther inland is to restrict, harness or guide activities--marketing, for instance--that proved troublesome before. Yet the greater

1/ For example: "We need to view fisheries as a system or a collection of systems" (Rothschild 1973:2021). The "uniqueness of artisanal fishing shows how necessary is an integrated approach to [its] problems" (Lacour 1973:2296).

the number of variables to be controlled, the harder it is for a development agency, with limited staff and resources, to do so. And regardless where the agency decides to draw the perimeter demarcating the fishery-in-context from an even larger context, the variables it treats as exogenous for policy purposes will still be able to influence if not even occasionally confound its models. The process whereby a narrow preoccupation with technology is broadened to include the biosocioeconomic environment in which technology operates thus tends at the same time to generate intense concern over boundaries. In order to save the project, it must somehow be protected from hostile elements in the environment--unscrupulous middlemen, for example.

3.116 Defensively vertical integration of this kind is probably nearly always unwise. Expanding the analytic scope of development need not call for a corresponding extension of physical control. Only an intellectually wide-ranging decision maker can know what a project can afford not to try to accomplish--where development can safely leave off and let unplanned change take over. Conversely, enlarging control to protect an endangered investment may reflect a project's own closure to negative feedback, and if that is so, by raising scale and stakes, vertical integration may end up making an initial mistake more expensive and harder to correct.

3.117 In order to avoid this result, a truly contextual approach to fisheries development would begin by recognizing that a fishery is not only a system or a collection of systems but also a subsystem within a larger system--rural society--and by asking whether the path to maximum benefits for minimum costs may not lie outside the fishery altogether. If vertical integration defines the development task as marine resource management but extends policy coverage of the trajectory of the commodity after it leaves the water, then horizontal integration defines the task as maritime community assistance but expands policy coverage of human interaction to encompass the larger society beyond the community. Fully contextual development departs, bioanthropologically, from both premises, that fish and people are important, and seeks the unique proper slant between vertical and horizontal priorities that best fits a given case.

3.118 Concretely, what could the horizontal alternative entail? Again, Firth's work in Perupok is instructive. Having written the single most intensive socioeconomic description of an artisanal Asian fishing system in the literature, he might have been expected to make equally fishery-focused policy recommendations for improving the fishermen's lot. Instead, his return visit in 1963 convinced him that modernization within Perupok had favored the fortunes of capital to the detriment of labor, and that this imbalance could not be resolved within the limits of the fishery. Instead, Firth recommended opening up labor-intensive employment opportunities entirely outside fishing--in tile making and cement block and pipe manufacture and through road building and other public works. Only then could development in the sense of "a general economic advance and not merely that of one [capital-owning] sector of society" be achieved (Firth 1966:348-349).

3.119 Firth's recommendation is also noteworthy for what he did not say. He did not advise further development of the commercial sector; it appeared to be doing well enough on its own. But he also did not recommend catch-focused aid to the subsistence sector, even though it appeared to be losing ground. Instead, he sought land-based ways to increase opportunities for rural employment.

3.120 Directly opposed to the landward thrust of Firth's "rural employment" strategy for Perupok in Malaysia is the deep-seaward direction of the "ocean production" strategies through which Japan, Korea, and Thailand, for example, have encouraged the rapid growth of their capital-intensive off-shore and distant-water fleets (Kasahara 1973:2351-2353; Tiews 1973). In the extreme case, that of a factory ship, the entire value-adding process may occur at sea. In between these two policy orientations lie Baum and Maynard's advice for Tobuan/Sual in the Philippines and the approach of Indonesian development agents in Muncar, that is, to help subsistence fishermen exploit the inshore zone, either by enlarging it and keeping commercial ships out of it (Tobuan/Sual) or by motorizing and otherwise equipping poor fishermen to increase their inshore catches (Muncar).

3.121 What variables need to be taken into account in determining the "slant" of integrated development? The most basic is the state of the biomass. If MSY has been or will soon be exceeded, and unless extraordinary conditions temporarily compel otherwise, the fishery should not be vertically integrated. When the resource collapses, or fades away, it will prove hard enough to "unscramble" the existing "eggs" (Crutchfield 1977:384; also see Elliot 1973; FAO 1970:46; Medcof 1963:90). Horizontal integration--using nonfishing employment or employment in underexploited fisheries to attract fishermen out of their existing jobs if not also out of their community--would help to scale down an overworked fishery to a level that could be maintained. Demobilization and migration will become increasingly necessary, for example, along the coasts that border the heavily fished Gulf of Thailand.

3.122 Conversely, the more slack in the resource, the more vertically integrated development can afford, in the long run, to be. In the short run, however, as previously suggested, horizontal bias will be advisable in the sense of making sure the project is understood by, and relates to the needs of, people outside as well as within the fishery, especially their need for security, lest the community feel development is meant to create and endow an enclave within their midst.

3.123 A second consideration is distributive skew, by degree and kind. The greater the "excess" in the share of terminal (retail) value received by a given link in the marketing chain, or the more numerous those "overrewarded" links are, the more steeply vertical the project should be--that is, the more public intervention to reform marketing is justified. 1/ In some cases

1/ Quotation marks emphasize the subjectivity of these terms. Neither diagonal nor any other development theory can supply policy objectives. See Part I.

(including the mudalalis of Table 6), beach wholesalers will be seen to receive relatively little compared to middlemen in urban "bottleneck" markets inland. Wherever reforms are to be directed, they should be carefully thought out and, if possible, negotiated with those concerned--witness the resistance of Calcutta's aratdars.

3.124 Another kind of skew, in extreme form, directly implicates the whole of the maritime community in which it occurs: where spontaneous commercialization and mechanization have biased the distribution of initial (catch) value on the beach in favor of capital over labor, where agricultural poverty has expelled surplus labor into the fishery to tip the balance of advantage even more decisively in favor of owners, financiers and dealers, and where these have combined roles to concentrate capital and control prices, a project's vertical tilt--notably, the temptation of planners to replace the exploiting class with a fishermen's cooperative immediately--should not be allowed to result in development's fate being fought out strictly within the fishery. For the government will probably be unable to defeat an entrenched local elite that has at least kept fishermen securely poor. Instead, officials should start small and think horizontally of ways to improve the economic health of the community so that exploited fishermen will have an alternative outside the fishery and, by their departure, strengthen the bargaining power of those who remain.

3.125 A third variable, distinguishable again by degree and kind, is inefficiency. Consider the choice between commercializing an artisanal fishery through vertical integration (by upgrading catch technology, building shore facilities, and adding value through processing for export, for example) and "pluralizing" it through horizontal integration (by training fishermen for, while helping to open up, nonfishing jobs). The criterion of efficiency defined in terms of output by weight per worker favors vertical integration. Initially, production is made more efficient by introducing larger boats and modern gear; next, the inability of existing processing and marketing systems to handle the resulting glut leads project managers to try to improve and control these as well. If efficiency is defined in terms of output by value per unit of investment, however, and assuming capital is more costly than labor, an artisanal fishery may be more efficient than a commercial one. Over all of coastal India in 1968-69, for example, the average gross return in rupees from a traditional (unmechanized) boat was 1.9 times the average operating cost, whereas the comparable figure for mechanized boats was only 1.5, and if the original purchase cost of the equipment were included, the gap would have been larger (George 1973:2173, 2176). In short, capitalizing an artisanal fishery through vertical integration may trade one inefficiency for another.

3.126 The conclusion for policy is not that one kind of integration is intrinsically superior to the other. Nor are these options mutually exclusive. Equipping some fishermen for nonfishing jobs does not preclude helping others to catch or process more fish. The point is to adopt a contextual perspective from which to recognize the trade-offs between, on the one hand, locking fishermen and funds into fishing as a commercial enterprise and, on the other hand, subsuming and even demobilizing the fishery under the broader aegis of rural development.

3. Summary

3.127 The case for a bioanthropological outlook on artisanal fisheries development rests on the interzonal nature of the subject matter between marine ecology and rural society, and on the comparative advantage of biology and anthropology in the study of each. The approach is also justified by the advantage in scope to be gained by defining the development task as some combination of (biologically sensitive) marine resource management and (anthropologically sensitive) maritime community assistance. Economic efficiency, legal adjudication, and the bioeconomic consequences of unrestricted access are all useful ideas, but their applicability is limited by the conditions that typify small-scale fisheries in developing countries.

3.128 A major insight available through ethnographic understanding is that fishermen, fishing, fisheries and maritime communities are extremely diverse. The myth of homogeneity implied by the single, abstract term "fisherman" must give way to disaggregation and case study. Different capture methods are suited to different fish in different marine niches, and every method is more or less costly and capital-intensive than another. Each species has its own market and price; some are also taboo. The determinants and consequences of the "simple" fishing act thus radiate backwards and forwards into the sea and onto land. Even the term "fishing community" is a misnomer, for in many maritime communities only a minority of the population actually hunts at sea. And even those who do fish may desire or have a secondary occupation to fall back on whenever the resource is hard to find or weather grounds them. Successful contextual development must recognize this differentiation and be sensitive to its intricacy and concreteness.

3.129 Fisheries projects that select or create full-time fishermen, for example, may do so for reasons of collateral and long-term commitment to the activity, yet in some conditions, part-timers could be a better risk. Occupational pluralism is rational in a village with few stable opportunities for employment. In a sample of relatively poor maritime communities in the Philippines, those with greater proportions of fishermen who also had other occupations were on the whole more receptive to development efforts and showed better loan repayment records; full-timers were also more willing to abandon the occupation altogether, which suggests dissatisfaction at being trapped in an unpromising activity--understandable in the Philippines in view of increasing biological and economic overfishing and competition from trawlers. In short, the "part-time mentality" of many fishermen should be respected as an instrumentally rational way of maximizing security and minimizing risk.

3.130 The fishermen's concern for security and risk extends also to distribution, and all three are related. Fishermen may oppose or feel alienated from technological changes that skew the sharing of benefits in favor of those with capital because these changes undercut the security of the poorest members of the community while raising the risks of those who must go into debt to obtain the new equipment or to become crewmen on the new boats. In an Indonesian case, boats, nets and motors the government had made available were actually burned. This reluctance to overcapitalise,

though for reasons of social security and not biological maintenance or economic efficiency, contradicts the common property expectation that fishermen, propelled by the gambler's prospect of windfall gains, will rush to over-exploit the resource. As commercialization proceeds, however, restraining norms may collapse, competition may intensify, and fishing effort may escalate. Development projects themselves may accelerate this process.

3.131 To prevent this scenario, schemes to insert technology alone should be avoided. Technology should be broken down into hardware and software, and serious thought should be given to introducing only the latter kind. Developers should think historically about the recipient community: How did previous technological change occur and with what consequences? In the absence of reliable secondary data, the memories of community elders can be tapped. Recognizing that the circumstances that surrounded earlier innovations may also affect future ones, care can be taken to approximate past successes and avoid past mistakes.

3.132 Aside from the obvious question of its physical fit with the resource, new hardware should be assessed in terms of its economic efficiency and its effect on employment. The latter criterion may supersede the former in many developing countries. If the change displaces labor, developers should explore in advance what can be done to accommodate the surplus elsewhere in the economy--in fish processing, infrastructure, handicrafts and activities related to agriculture, for example. In the same vein, in a choice between software and hardware, an emphasis on practical training in fishing and nonfishing activities will generally prove more beneficial than the delivery of equipment with only minimal guidance regarding its use. This is because the successful application of new techniques requires their coordination with other elements of the fishery and with other opportunities in the community--linkages that all involve ways of behaving and adapting behavior.

3.133 Steps should also be taken to encourage local responsibility for project innovations. Local networks of social respect--successful rotating credit associations, for example--can be examined as potential carriers of project-initiated change. If a cooperative is established, it should be linked as closely as possible to the community interest--as expressed, for example, on ritual occasions--and should operate as openly as possible to promote participatory and therefore potentially more legitimate development. Family connections, though likely to prove troublesome in administration, can nourish a collective obligation among those who receive gear to use it effectively. And all of these steps should increase the likelihood that loans will be repaid.

3.134 If technology must be seen in context, so must another key element in fisheries development: middlemen. To assume that brokers are enemies of progress who should be ousted from the fishery is unrealistic. Preferable is an effort to distinguish different kinds of middlemen and the different functions they perform and to understand not only how they objectively exploit their fishermen clients but also what subjective benefit the latter derive from the relationship. Often, a broker will be observed to shoulder

the considerable risks that likely fluctuations in physical supply and market price entail, thereby enhancing the long-run security of the debtor-producers from whom he or she buys fish. Many fishermen may prefer to be in debt to someone they know who has long demonstrated personal concern for them and their families than to borrow from a government whose commitment to their future appears more short-run and contingent if not also extractive. In a choice between security and capital, such fishermen are likely to prefer the former, and project planning should accommodate their priorities: If development would speed commercialization, how can fishermen be made less vulnerable to distant market forces? How much risk are project authorities willing to accept and for how long, without themselves replacing customary patrons and leaving beneficiaries unable to cope with post-project conditions? How can the project enhance its participants' skills and savings to help them become autonomously secure?

3.135 At the same time, based on actual knowledge of different brokers' costs, services, and rewards as revealed by the shares of retail value received by the main links in the marketing chain, development personnel may decide that the "excess" profits of certain types of middlemen should be redistributed in favor of presently "underrewarded" links--including producers but also others in the chain (porters, for example) whose needs may even be greater. In Sri Lanka, proportionally greater profits were made not by brokers on the beach but by their counterparts in the capital city's central market (although missing data make this comparison incomplete). Roughly equivalent patterns of profit concentration in urban markets appear to operate in West Bengal and the Philippines. Before trying to smooth out such a marketing chain, developers should carefully estimate the repercussions along it of proposed reforms. Whenever possible, changes should be negotiated with those involved--for example, by trying to increase sales by volume to compensate for reduced profits per unit sold.

3.136 Market control illustrates vertical integration, in which project managers try to improve and reorganize the entire progression from point of catch to point of final sale. Alternatively, a project may be integrated horizontally with the surrounding economy. Vertical integration encourages full-timers and increases their and the government's stake in the fishing process--for example, by building and staffing shore facilities. Horizontal integration encourages part-timers and opens the fishery as much as possible to outside opportunities. These are not mutually exclusive strategies, but there is tension between them, and official resources are likely to prove too scarce to support both in full form at the same time. Development personnel should therefore try to determine what diagonal "slant" is best during what phase of a project's operation.

3.137 Vertical integration is most appropriate when the marine resource is abundant, when the distribution of profit down the marketing chain is grossly skewed, when the sharing of catch value on the beach is relatively even, and when the existing fishery is highly inefficient in terms of output by weight per worker. Such projects are likely to impart improved hardware to producers while processing and marketing facilities are replaced or improved to prevent the increased supply of fish from deteriorating physically

and driving down returns to producers. The cost of such a strategy is, in the short run, that it tends to channel benefits not outward but within and into the fishery, thereby possibly alienating the surrounding society and creating an expensive, capital-intensive enclave that will prove hard to "gear down" if and when the resource is overfished. Therefore, even when vertical integration is initially appropriate, attention should soon be paid to generating employment-creating spin-offs in the community, training fishermen for alternative jobs, and encouraging fishermen and their children eventually to reinvest their profits in agriculture, crafts or other opportunities outside the fishery.

3.138 Horizontal integration is most appropriate when exploitation of the marine resource is nearing or has exceeded MSY, when profits are shared relatively evenly across marketing chains but unevenly as shares of catch value on the beach, and when the fishery is relatively inefficient in terms of output by value per unit of investment. If catch value is shared fairly evenly within the coastal community, but inland retailers, brokers or processors enjoy high mark-ups, then vertical integration can attempt to iron out kinks in inland markets without simultaneously having to confront an "overrewarded" local elite on the beach. Indeed, insofar as "excess" profits inland are shifted back to enlarge catch value, a system of relatively equal sharing will enhance the chance that all participants, including those who have only their labor to contribute, will benefit without further government intervention.

3.139 By the same logic, if the reverse is true--that is, if the distribution of retail value from urban markets is significantly less skewed than the sharing of catch value on the beach--although it may be tempting to take over local ownership, processing and marketing functions on behalf of exploited producers, horizontal integration will in the long run allow labor to shift out of the fishery, improving the competitive position of those who remain, while avoiding a confrontation on the beach that developers might initially lose to the detriment of all concerned. Finally, an inefficient fishery in terms of value has probably already been overcapitalized in relation to the resource. Vertical integration may make operations even more capital-intensive, raising the scale of inefficiency and exerting greater pressure on dwindling stocks. Instead, capital if not also labor should be drawn out of the fishery into more productive alternatives.

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