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9. ABSTRACT

To identify socio-economic research issues for fisheries development in the world's developing nations, 22 university and governmental personnel met for two and one-half days in October 1972, at the University of Rhode Island. Participants were divided into three working groups, with each assigned to consider issues in one of the following areas: 1) commercial fisheries, 2) artisan coastal and inland fisheries, and 3) the relationship between agriculture and fisheries. Commercial fisheries were defined as a special circumstance of deep ocean fishing, while artisan coastal and inland fisheries were defined to include the remainder of fishing activity. Past fisheries development research efforts have concentrated on locating and identifying ocean stocks, and designing capture gear and techniques and training fishermen in their use, rather than on social-economic issues. With the increasing awareness of limitations in natural fishery stocks and aquaculture potential, the interest in solving the world protein shortage with fishery products does not seem realistic and has receded. In areas of the world in which incomes are rising, increased demand and higher prices for fish and fish products can be expected, as can rapid population growth. In particular, market development and modernization, a systems management approach to river and coastal lagoon development and the integration of fisheries with agricultural enterprises seem critical.

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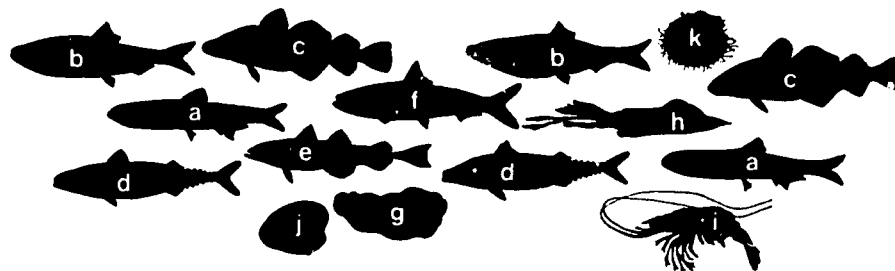
Socio-Economic Research Issues in Fisheries Development

A report on a workshop, held jointly by the International Center for Marine Resource Development and the Agriculture Development Council, at the University of Rhode Island, Kingston, Rhode Island, October 25-27, 1972.

**International Center for
Marine Resource Development**



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Cover: Among the world's largest marine catches each year are these six fish species and five invertebrates: (a) Peruvian anchoveta; (b) Atlantic herring; (c) Atlantic cod; (d) mackerel; (e) Alaska walleye pollack; (f) South African pilchard; (g) oyster; (h) squid; (i) shrimp and prawn; (j) clam, and (k) cockle.

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To identify socio-economic research issues for fisheries development in the world's developing nations, 22 university and governmental personnel met for two and one-half days in October, 1972, at the University of Rhode Island. This document represents their collective conclusions.

Participants were divided into three working groups, with each assigned to consider issues in one of the following areas: (1) commercial fisheries, (2) artisan coastal and inland fisheries and (3) the relationship between agriculture and fisheries. Commercial fisheries were defined as a special circumstance of deep ocean fishing, while artisan coastal and inland fisheries were defined to include the remainder of fishing activity. This classification was adopted only after considerable discussion in general session.

It was clear to all present that there is a continuum of economic activity in fishing which ranges from the most primitive efforts of some individual fishermen in coastal and inland waters to very capital-intensive efforts of deep-ocean fishing fleets with global capability. Moreover, any division of the fishery by fishing area would necessarily place fishing operations covering a wide range of commercialization in the same class. Therefore, the classification adopted is not sufficiently precise for drafting ground-level development programs, but this was not the objective of the workshop. What was at issue was to identify a set of socio-economic issues with reference to the total fishery resource.

Implicitly, research on some of these issues would necessarily identify fishermen groups with unique problems within a given country's fishing sector. At some future time, when a considerably greater body of research material is available, a workshop may be useful to deal with the special problems of more narrowly defined fishing communities.

The reports of the working groups necessarily overlapped areas and topics of consideration. This was particularly true for groups 2 and 3, artisan coastal and inland fisheries, and the relationship between fisheries and agriculture. In this final report, we have attempted to eliminate the more obvious repetition.

Thomas F. Weaver and Harlan C. Lampe, *co-directors*

Commercial Fisheries

The group reached six major conclusions:

1. Commercial fishing is distinguished from other types by the high level of technology employed where technology and capital intensity are highly correlated. Such fishing will usually be found in what are commonly called deep sea fisheries.
2. In the next few years, we are likely to witness substantial extensions of fishing limits. The development of commercial fishing by the developing nations will probably be directed largely toward exploiting fisheries within such extended fishing limits, organized on either a national or regional basis. Fishing for tuna and fisheries in the Indian Ocean may provide the two principal exceptions.
3. In any event, added emphasis will be given to the need for multiple-stock management schemes which include provisions for controlled access by all national, regional and international fisheries. To the best of our knowledge, little if any research effort—outside of fisheries biology—has been undertaken on the aggregative problem of the management of multiple stocks. This general, worldwide problem needs to be studied to provide appropriate management tools for not only the developing nations, but for all nations.
4. We consider that, currently at least, it is possible to identify only a limited number of issues which can be researched and which are applicable to the developing nations in specific. Many, if not most, of the problems of the development of commercial fishing in such countries are specific to the country concerned and need to be studied on an *ad hoc* basis as the proposal for a development project is made.
5. Issues applicable to the developing nations in specific may be uncovered in three ways: (a) by classifying countries in relation to their fishing problems to see what common elements exist; (b) by instituting a comparative study of the various fishery development projects that have been undertaken in recent years, beginning with a pilot study on a sample basis, and (c) by studying the various joint ventures that developing nations have embarked upon with the fishing industries of more developed countries.
6. Finally, we consider that, in view of the two principal directions for development activities in international fisheries, special studies might be made of (a) multiple stock management in the Indian Ocean, and (b) the world tuna fishery with special reference to the position of the developing nations.

Artisan Coastal and Inland Fisheries

This workshop group divided the artisan fishery into two basic categories, capture fisheries and culture fisheries.

Although the two are considered separate types of enterprises, they both provide a similar protein product and compete in the marketplace, not only against other protein sources but against each other. Moreover, these enterprises represent alternate development possibilities that may offer sources of employment and income in various countries, but also may compete against each other or against other segments of the economy for scarce investment capital and to a lesser extent, labor.

Capture Fisheries

Although some special problems may have to be considered separately for inland freshwater and coastal lagoon capture fisheries (e.g., pesticide content of the water), these two fisheries have many similar characteristics and, therefore, can be considered under similar discussion topics.

One of the primary considerations in dealing with development possibilities in both fisheries is their common property nature. Since there is no ownership of the resource but there is relatively easy entry and a generally high demand for the fish, a continual and definite tendency in most areas is for the effort (i.e., men, nets, boats, etc.) to be at a level near, if not beyond, the maximum sustainable yield. The major implication of this is that either increases in output from these fisheries come at a rather rapidly increasing cost, or that an increasing effort—boats and men—may not increase output.

As a result, major research efforts should be aimed at improving resource allocation at the harvesting level, improving efficiency in processing and in the distribution and marketing system, and carefully considering the cultural, legal and political implications and limitations of any recommended changes.

These aims imply that major research efforts should be devoted to the five following areas:

1. Assessment of abundance and availability of stock with emphasis on determining levels of fishing effort in relationship to estimates of maximum sustainable yields of the various species. This should also include seasonal fluctuation assessments to determine the effectiveness of multi-species operation.

2. Investigation of costs and earnings in fisheries with special attention to effects of technological changes on earnings and effects of alternative levels of labor and capital. Investment in fisheries could then be com-

pared to alternative investment opportunities, particularly in the rural areas of the economy.

3. Consideration of the impact of land-based development on fisheries and fishery populations. Such studies should also consider possible benefits to fisheries that could result from development—such as improved transportation to ease their access to markets—as well as resulting dysfunctions—such as pollution of water.

4. Studies of market processes and demand to determine quantity and price relationships and to determine whether or not certain ports and landings are sufficient to support an efficient processing and transportation system.

5. Analysis of political and institutional problems and their effect on the establishment of effective management programs that would achieve desirable conservation, development and equity objectives.

Although the above areas are listed separately, it is recognized that they actually form a basis of what must be considered a dynamic, interacting system and that changes in any of the aspects implied by these research areas will, in fact, have an impact on all others. Thus, a “full” systems approach should be taken in considering coastal and inland capture fishery development problems.

Culture Fisheries

These differ from common-property-resource capture fisheries by requiring control of production sites through ownership or lease. They also differ by being more competitive with agricultural activities for land and water.

These circumstances may impose higher unit production costs than for coastal capture fisheries. At the same time, the range of capital or labor intensity possible in culture fisheries is great, and substantial opportunities for combined agri-aquacultural systems exist.

These properties of culture fisheries suggest the following areas for research efforts: (a) study of specific marketing and projection economics, including credit availability, for specific countries; (b) determination of levels of complementarity between agriculture and aquaculture; (c) implications of aquaculture production systems for equitable income distribution; (d) organization of aquacultural extension services to include information on adaptive research, disease control and effects of pesticides and other man-made additives on the water; and (e) study of legal aspects of land and/or water use for aquaculture.

River Development

River development schemes can be linked to all of the aspects of fisheries development considered in this workshop as well as to many aspects of agriculture and to other development activities, such as public health, siting of industries and population displacement.

The resulting complexity requires a systems approach in planning from the very outset, even though the initial inclusion of fisheries in such an approach (potential losses and gains, for example) has not characterized past river development planning efforts.

The research problems which emanate from this type of development are so complex and so closely interrelated with other aspects of economic development, especially agriculture, that this workshop specifically focusing on fisheries lacks requisite expertise to delineate major research areas.

We do recognize, however, that river development projects constitute attractive, albeit problem-fraught, avenues for economic development and that a high percentage of the rivers in the developing countries are likely to be so modified.

It is, therefore, extremely important that all questions of socio-economic impact be considered by multi-disciplinary planning teams during the very first stages of planning, i.e., before beneficiaries and donors are committed. As this is not current practice, it is important that we explore modes—workshops, semipermanent interdisciplinary working groups and institutes—to bring about the necessary changes in river development planning processes.

Agriculture and Fisheries

Although it has been recognized that fisheries and agricultural development are closely related, historically the fisheries have received far less attention. Unquestionably governmental development objectives and policy, including the conservation and earning of foreign exchange, improving income distribution and meeting nutritional requirements, can be met best by rational use of the economic potentials of both the fisheries and agricultural sectors. Therefore, an effort was made by this workshop group to identify both complementary and competing interrelations between fisheries and agriculture, and to identify research concerns which are particularly relevant for planning and decision making.

We recognized that priority concerns are quite different among geographic regions. The economic structure and resource potentials of the fisheries sectors, and the agricultural situations, are extremely variable. Thus, we found it necessary to discuss research issues at a fairly broad level.

Four major subject matter areas were delineated: (1) complementarity between fisheries and agriculture; (2) competition between sectors; (3) demand interrelations, and (4) water management. For each of these, suggestions were made regarding priority research issues.

1. Fisheries development complements agriculture as a source of employment for low skilled, underemployed and unemployed rural populations. At the same time it competes with agriculture for technical and managerial personnel. With this as a starting point the group reached three conclusions:

a. A prerequisite for effective planning is a census and/or demographic base. Ideally, these data should be collected prior to formulation of development or project goals. The data should include a census of the present fisheries labor force, as well as of other sectors of the population likely to be affected by fisheries development plans. In addition, a census of professional and technical personnel should be undertaken for inclusion in an assessment of program needs.

b. An assessment should be made of the educational requirements of technical and management trainees and extension personnel concerned with fisheries development. Their training should include information on the complementarity of and competition for resource use between fisheries and agriculture.

c. Studies should be carried out to determine the social and economic characteristics of the fisherman population. Attention should be directed to factors affecting recruitment into the fishing industry and as well to the influences holding fishermen in the industry or limiting their occupational mobility. In systems where indigenous fishermen are part-

time farmers, data are needed on the structure and composition of fisheries units and their relation to the production arrangements. It is necessary to understand better the nature of production and work decisions regarding the local fleet as they affect the labor flow between fishing and other sectors of the economy. For example, such studies should take into account the structure of the family and household units and kinship patterns as they affect both decision making and labor flows.

2. Fisheries compete with agriculture for capital, foreign exchange, technical services and government credits in area development schemes. This brings, at least, three needs to researchers:

a. Research on enterprise combinations and production in the locality of the fishery resource. Such studies improve understanding of existing distributions of labor and capital and of the effects of specific development policies, including manipulation of prices, land or water tenure and credit availability.

b. Research on the possible consequences of adaptations of fisheries technology on existing enterprise combinations. How will the introduction of a given technology in either fishing or agriculture affect existing enterprise combinations and resource allocation?

c. Research on effects on income distribution of alternative management systems for the fishery resource. Research also is required on institutional structures which support the fisheries sector and on related infrastructure and service activities including roads and transportation. Investments in these activities are related to development potential of both the agricultural and fisheries production units.

3. The group recognized the need for research into product demand and market structure, and identified several specific areas:

a. Demand for fish products and the cross elasticities of demand by income groups between fish and other sources of protein.

b. Comparative costs of protein from agricultural, fisheries and other sources in order to help meet the objective of increasing the availability of protein.

c. Pricing policy for fish and competing products. The methods by which fish prices are determined and middleman margins established are little understood. Since the fisherman's response to new technology is tied to price expectations and the government can influence price, an understanding of this pricing process is important. At the same time governmental marketing policy should be based on a firm understanding not only of middleman margins but of costs of services provided in the existing markets. Typically, particularly for perishable commodities, the middleman's margins are cited as serious restrictions on the development of the industry.

d. Complementarities in marketing infrastructure and facilities. These include transportation and communication systems which can be used by both agricultural and fisheries traders or merchants, cold storage for fish in connection with market stalls in urban market centers, processing permitting transportation of fish to distant market centers, etc.

e. Use of fish distribution systems for supplying low income groups and the relation of fisheries to national nutritional objectives.

4. Agriculture and fisheries often use water resources in conflicting ways. Research needs in the analysis of such conflicts include (a) the effect of irrigation development on coastal lagoons and estuaries; (b) the use of seawater in specialized crop production systems, and (c) the run-off of agricultural chemicals into marine and freshwater fisheries.

Discussion and Summary

In the plenary discussion which followed the presentation of the workshop group reports, there was general satisfaction with the conclusions of the last two reports, artisan fisheries, and agriculture and fisheries. On the topic of commercial fisheries, however, there was evidence of considerable feeling that the workshop group had concluded too easily, particularly in their oral presentation, that there is little opportunity for the developing nations to operate deep ocean fleets.

The plenary group indicated they felt that studies need to be carried out on the economics of currently operating fleets, and some of these fleets, principally from Taiwan, Korea and Cuba, are those of developing nations. They agreed that opportunity exists for considerable expansion of the deep ocean fishery in the Indian Ocean. The plenary group disagreed with the subcommittee insofar as it implied that present world fishing capabilities, in terms of available ships and technology, are sufficient to fully exploit deep ocean stocks and that no apparent rationale exists for investment in increased fishing capacity. The subcommittee had implied that lack of both technological expertise and an experienced deep ocean labor force are serious, if not insurmountable, constraints on the development potential of the less developed nations in the area of commercial fishing. This also was questioned.

The subcommittee, it seemed to be felt, failed to take fully into account the tendency for coastal nations to seek control, either on a territorial or species basis, of fishery stocks associated with their coastal regions. There is a strong argument not only for studies of existing fishing fleet economics, but for evaluation of deep ocean fishing fleets which could exploit best those resources over which the developing nations may claim control under existing or foreseeable international agreements. In fact, such studies might themselves be invaluable inputs in assessing the impact of territorial or species regulation on the economics of the developing nations. From the point of view of nations with under-utilized fishing capacity, there is no need for further global expansion of capture capacity. Nevertheless, the opportunity may well exist, in the opinion of some of the workshop participants, for profitable new entry of some of the developing nations.

Summary

In summary, it appears that a number of socio-economic issues associated with modernization through the development of fisheries need investigation. Information on fishing and fishermen in the developing countries is scarce, and what is available is less reliable than that for other

non-urban sectors. This may reflect the fact that past fisheries development research efforts have concentrated on locating and identifying ocean stocks, and designing capture gear and techniques and training fishermen in their use rather than on social-economic issues. With the increasing awareness of limitations in natural fishery stocks and aquaculture potential, the interest in solving the world protein shortage with fishery products does not seem realistic and has receded.

In areas of the world where incomes are rising, increased demand and higher prices for fish and fish products can be expected, as can rapid population growth. These forces make the issues raised by the workshop both timely and important. In particular, market development and modernization, a systems management approach to river and coastal lagoon development and the integration of fisheries with agricultural enterprises seem critical. Fisheries development can help solve employment and income equity problems in many nations of the world, but not unless more attention is concentrated and research is done on economic aspects of fisheries development.

Fisheries Education

At the last day of the workshop, a plenum was held with the subject, fisheries education in United States universities and its applicability for students from developing countries. Participants seemed generally concerned about the cost of doctoral programs and particularly the cost of educating foreign students. Many felt—particularly experts in the field—that the master of arts degree would give a better education per dollar spent. Several speakers stressed the flexibility needed in an educational program for foreign students due to the very different academic backgrounds possessed by students from different developing nations.

The time spent—less than an hour—was not found to be sufficient for discussion of such a comprehensive issue, and all agreed that a workshop on fisheries education to discuss the issue in depth should be seriously considered.

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