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A TECHNICAL ANALYSIS

OF

OMAN'S FISHERIES SECTOR

by

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I. Importance of the Fisheries Sector

A. Fishery Resource of Oman

1. Known resources

It is now well established that Oman has large commercially valuable fishery resources, only a part of which are currently utilized. For several commercially important species groups the sustainable annual yield has been determined with a fair degree of reliability. These groups are lobster (2,500 tons), kingfish (25,000 tons) and abalone (30 tons). For a second set of species groups a conservative yield has been estimated that is a safe figure and that can very likely be increased as more complete information becomes available. These groups and the respective conservative yield estimates are as follows: demersals (50,000 tons), tuna (40,000 tons), sardines (200,000 tons).

The total sustainable annual yield estimate for these two groups combined is roughly 317,000 tons compared with the actual current catch of about 107,000 tons per year.

2. Resources of unknown size

The third group of species are not fished heavily and very little firm information exists regarding the magnitude of these stocks. On the basis of surveys by FAO and other groups and industrial fishing by vessels from Japan, Kuwait, Greece and the USSR in the 1960s and 1970s, it is known that significant other fishery resources occur off the coast of Oman. Among these are large pelagics (billfish, jack, dolphin, barracuda, shark) small pelagics (anchovy, herring, others), squid and deep water demersals. Most of the pelagic species move in and out of Oman's extended economic zone. These "shared stocks" are largely accessible to Omani fishermen while in Oman's or international waters, but may eventually be harvested elsewhere by foreign fishermen. The Peoples' Democratic Republic of Yemen and Somalia have recognized the existence of these important fishery resources along their coasts, and the Soviet Union is harvesting the stocks off Yemen. In cases of conflict, international law gives priority to nations that have utilized fishery resources historically.

Early estimates of total sustainable yields of 4-5 million tons seem now to be too high. In addition, these early estimates included mesopelagic species that are not economically harvestable at this time as half or more of that total. Nevertheless, it is probable that low value species (sardines, anchovy) have been largely underestimated (section A.1., above), that unutilized species (squid, deep water

benthics) have significant potential, and that yields for some high-value stocks (tuna, billfish) can be increased. Other smaller resources of economic value include seaweed, clams, oysters and shrimp.

In summary, on the basis of the most conservative estimates, it would appear reasonable to anticipate a threefold increase in the tonnage of fish landed from Omani waters. More realistic projections based on all available information from the region and on comparisons with areas of similar productivity elsewhere are higher indicating a five-to ten-fold increase (to 500,000 - 1,000,000 tons) in annual yields may eventually be possible.

B. Economic Value

1. Contribution to GDP

Current landings of roughly 100,000 tons have value to the fishermen of R.O. 32.5 million based on Government statistics.* This figure has increased rapidly as follows:

1976	R.O.	6.0 million
1981	R.O.	21.6 million
1986	R.O.	25.5 million

*R.O. 1.000 = U.S. \$2.63

In 1986 this value was equal to 1.4 percent of the non-mining and quarrying (oil) GDP. The multiplier effect of this raw material on other segments of GDP is assumed to be at least 3.0.

- The industry is now growing slowly relative to its potential reflecting an extremely cautious position on the part of the Directorate General of Fisheries (DGF) with regard to fishery resource exploitation and a desire to restrict competition with traditional fishermen, and thereby maintain their lifestyle. Nevertheless, some expansion of the sector is underway and Government policies are shifting as the potential contribution of this sustainable, natural resource-based industry to national goals is recognized. Steady expansion of the contribution to GDP is anticipated, especially as exports of high value products from the sector increase (see below).

2. Employment

In 1987 an estimated 13,500 Omani fishermen were employed in the sector. About 800 Omani transporters serve the industry buying fish on the beaches and transporting them to markets. No estimates of other employment in the sector exist but supporting mechanics, market workers, suppliers of fuel, fishing gear, and ice and processing workers probably equal the

number of fishermen. Although no data are available, a large portion of the laborers supporting the industry are foreigners.

Expansion of the sector should be orchestrated insofar as is possible, to utilize traditional fishermen, trained over time to operate new, more efficient boats and fishing gear. There will be employment opportunities as well for young Omanis willing to learn new trades in various segments of the industry. The attraction for young Omanis will be higher incomes made possible through the use of larger vessels, more efficient gear and better prices for well-handled fish products. In addition, early in the expansion of the sector foreign fishermen will need to be hired to operate new vessels pending training of qualified Omanis.

3. Foreign exchange

The following is quoted from the "Indicative Long-Term Fisheries Development Plan" prepared by RDA International, Inc. (RDA), "Increased exports accompanied a rapid growth of the domestic market. Most of the export trade consists of four major commodities: (1) chilled kingfish, tuna and sardines to Saudi Arabia and the United Arab Emirates; (2) frozen demersal fish (from trawler operations) to Korea, and some premium quality fish (snapper, grouper) to markets in the Gulf, Jordan, and to lesser extent Europe and the USA; (3) dried sardines as animal fodder to the UAE; and, (4) frozen lobster to Europe, USA, and the UAE for re-exporting. Accurate data on fish exports are not available."

The best estimate of domestic consumption is 57,000 tons for 1986. If it is assumed that this is relatively constant from year to year, it can be concluded that of the 107,000 tons total current landings an estimated 50,000 tons is exported. Value of this 50,000 tons to the fishermen would be about R.O. 16 million. However, the tonnage may be misleading as the higher value products are often exported, e.g. lobster, abalone and kingfish, increasing the value of exports relative to the total catch.

Government customs reports indicate exports of fishery products totaling 18,472 tons in 1986. Officially fish exports are valued at R.O. 9.7 million for 1986 and R.O. 11.8 million for 1987. These figures are probably underestimates of exports, but in any case, exports have surged since 1986. Plans call for increasing harvests to 120,000 tons by 1990, 200,000 tons by 1995 and 350,000 tons by 2005. Assuming a large increase in domestic consumption from the current 57,000 tons to 100,000 tons by 2005 this would leave 250,000 tons for export. At today's prices this 250,000 tons would have a dockside value of R.O. 80 million and an export value considerably higher than that depending upon the species mix and the degree of product processing and refinement prior to export.

4. Potential economic impact

a. Value of resources

The rate of expansion of the fishery can not be estimated accurately as it is closely interrelated with numerous unresolved national policy issues, the role of the Oman Fishing Company (OFC), and the willingness of the DGF to permit expansion of the sector. In the Master Plan projections are made for catches through 2010 reaching an annual harvest of 399,000* tons by that year. For this catch a value to fishermen of R.O. 107 million is projected compared to the current value of R.O. 32.5 million. The retail value of the 2010 catch is estimated to be R.O. 250 million. Overall improvements in the quality of the product landed may result in even higher average prices than were used for these estimates. In terms of overall impact on the economy, a multiplier of 3.0 should be used for the dockside landings value.

b. Private sector participation

Through 2010 investments required by the private sector are estimated to be R.O. 100 million comprised of R.O. 81 million for vessels and R.O. 19 million for shoreside facilities and transport. The industry will, according to the Master Plan, provide an attractive investment opportunity for national sources of capital thereby satisfying a national objective. Very strong world markets for fish products, limited supplies and the potential for high catch rates all support the financial attractiveness of these investments.

c. Government investments

As part of the Master Plan, Government investments totaling R.O. 57 million are planned. Much of this investment must be made prior to the major expansion of the fishing sector as harbors and supporting infrastructure are required for this expansion. Major components of this investment are:

	<u>R.O. millions</u>
harbors and drydock facilities	54.0
training and education facilities and equipment	<u>3.1</u>
	57.1

Above and beyond these investments in infrastructure, a new level of commitment is required on the part of government to fully staff and support the DGF, the MSFC, the Sultan Qaboos University fisheries programs and the Council for Living Marine Resources Management together with its supporting working groups. A wholehearted, vigorous effort will be required by leadership within the Ministry of Agriculture and Fisheries to ensure that outstanding young Omanis are employed in fisheries

programs, that they are properly trained and educated to execute their duties, and that they are fully supported with necessary equipment, vehicles, supplies, back-up personnel and operational funds to build a modern fisheries sector in Oman.

C. Other Values

1. Nutrition

In 1981 the Food and Agriculture Organization of the United Nations (FAO) estimated per capita consumption of fish in Oman to be 20 kg/year. It is probable that this level has increased since 1981 as landings have increased and distribution has improved. Nevertheless, opportunities still exist for improving the nutrition of Omanis through increasing availability of high quality fishery products. Although fish protein supplies are relatively abundant close to the coast, they have traditionally been transported to the interior to supplement available red meat in the diets. Both the quality of products available inland and the quantity are still lacking. Fishery products are healthful foods both as sources of essential amino acids found primarily in animal protein and as a source of the "omega-3" fatty acids recently found to be important in preventing heart disease. Increased consumption of fish products is an important nutritional objective that will affect the health of Omanis.

2. Diversification

Diversification of the economy is a goal of the Government and expansion of the fisheries sector will make an important contribution to this goal. In a nation that has few natural resources and even fewer that will provide sources of income and employment that are sustainable indefinitely, rich marine resources are particularly important.

Development of the fisheries sector with adequate processing for internal and export markets and full development of supporting industries including vessel construction and repair, fishing gear construction and repair, refrigeration services, engine maintenance and repair, transportation, and other supporting services will increase diversification. The value added through processing, packaging and preserving fishery products for sale may double the market value of the products. The fish processing industry, especially as it relates to products for export, is a significant new industry by itself.

3. Omanization

As a new modern fishing and fish processing industry develops, an objective is to produce fishery products of high quality in an efficient manner. To produce products efficiently, at prices that are competitive on world markets, Omani fishermen and fishery industry workers must multiply their

productivity by using modern equipment. As worker productivity is increased, personal incomes can also be increased making the fishing industry an attractive and respected source of employment, as it is in the developed countries of the world.

In this way fishing and fishing industry employment will provide attractive careers for young Omanis and the trend of declining employment in the industry will be reversed. Training of Omanis in the skills and trades of modern fishing industries will help prepare them quickly for the new careers.

Additional Omanization is offered by the industry in that it will provide new opportunities for investment of Omani capital and for businessmen, dealers and suppliers through many small businesses.

4. Infrastructure

The infrastructure necessary for full development of the fishing industry, ports, ice and freezing plants, expanded utilities, roads, shipping service to foreign ports, vessel and gear manufacturing capabilities, fuel facilities and numerous other supporting businesses, is an infrastructure that is of value to the nation in many other ways. Expanded ports offer new opportunities for commerce, for example, and better roads facilitate communication and transportation generally. The development of infrastructure to service fisheries known to be profitable will progressively open additional opportunities for marine resource industries that have not to date been seriously considered. Some possibilities for future development are fish meal, fish oil, seaweed products, clams and oysters, precious corals, deep water fishes and distant water resources of the open sea.

5. Self-sufficiency

The sea offers a permanent source of food and income that is not fully utilized by the nation. Omanis utilize and enjoy seafood although per capita consumption, about 20 kg/year, is modest. Full development of a national ability to harvest its marine resources will add to the self-sufficiency of the nation and to its ability to sustain its people independent of foreign sources of food. The surplus, exportable production is a commodity in great demand by other countries of the world and is therefore a valuable item of trade that places Oman in a strong trading position.

6. Social benefits

Along with the improved skills and increased productivity of fishermen and fishery industry workers will come increased income, experience and social status. Living standards of fishermen and their families will be improved and families

will benefit from better educational opportunities, improved medical care, increased leisure time and increased participation in social and cultural activities.

7. Biodiversity

The project will contribute to biodiversity in at least two significant ways. A portion of the project is designed specifically to encourage protection and conservation of sea turtles, an abundant resource in Oman. This unique environment, one of the few in the world where endangered species of turtles have been protected from overharvest, provides an ideal setting for research which will promote their conservation worldwide. Overfishing reduces biodiversity, in some cases leading to loss of species. The project will help prevent overfishing of marine resources in Oman.

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II. Sector Constraints

A. Introduction

In the following sections major constraints to development of the fisheries sector are described and discussed. In Table 1 and below this information is summarized under the headings Human Resources, Private Sector Growth, Institutional, and Information and Knowledge Gaps for convenience; however, many of the constraints apply to more than one of these categories. In Table 1 additional summary information is presented regarding objectives to be addressed, inputs required, outputs expected and desired impact of the effective removal of the constraint. In the discussion particular attention is given to constraints that will be addressed through the planned project assistance.

Several points should be made relative to this discussion of constraints. First, all the constraints discussed are currently impeding the development of the sector. It is likely that new constraints will arise as the years go by. Second, the removal of a given constraint or bottleneck means that a new constraint becomes a limiting factor at another level. The constraints faced by the fishing industry today in Oman are closely intertwined and in many cases they cannot be separated neatly. Many examples will be obvious in the following section.

A "schedule for resolution of constraints" is attached (as Table 2) that requires some explanation. The time periods identified are periods during which a major effort will be required to alleviate a serious constraint. Of course, the process is gradual and no constraint completely disappears at a point in time. The schedule will hopefully be a useful mechanism for focusing on relative priorities of action needed to address the constraints.

Constraints have been ranked in terms of their relative priority based on their linkages with other constraints and the magnitude of the impact of the constraint on the growth and development of the sector. The highest priority constraints have been identified on the basis of their magnitude and the impact on potential growth of the private sector if the constraints are not removed. Constraints assigned a second level of priority are also important problems which must be dealt with on a fairly urgent basis but which require some degree of lessening of first order constraints first. These are constraints for which some delay, although damaging, is not devastating. The third level of priority still represents serious constraints to industry development. These are constraints for which action could be delayed temporarily without serious losses to the industry.

B. Human Resources

1. Resource managers and administrators

Perhaps the most critical human resource constraint in the fisheries sector today is the lack of skilled resource managers and administrators. A generic problem is that the most capable people are not attracted to the fisheries profession as it is not considered a prestigious profession. Beyond that, however, the leaders have not been trained in the special problems of fisheries management, common property resource utilization or natural resource conservation and use. Many lack technical understanding of fisheries and fishing as well as basic biological principles. A closely related problem is the inexperience in standard methods of organizational management and administration. Without increased capabilities in these areas an effective fisheries administration will not exist.

Well educated and motivated managers are vital in helping the DGF to establish sound policies, administer its programs, and to serve other necessary functions. Addressing this vital need merits the highest priority as most other constraints are related directly to the current insufficiency of qualified managers.

Increased education, training and exposure to properly functioning fisheries organizations are required for administrators, section managers, fishery resource managers and for those who are likely to be elevated to these positions of responsibility. Staff members who are in positions to influence resource management decisions should be included.

2. Scientists, biologists and university faculty

This category of specialists with advanced, highly specialized academic degrees is virtually absent in Oman and posts requiring this level of education have, in the past, been filled by foreign experts. Although a sudden transition to Omani staffing is impossible, the need for change is critical if Oman is to build a capacity to plan, design and execute research and to provide university education with Omani faculty. Reliance solely on foreign experts to provide these services is counter to the Omanization theme and will never be entirely satisfactory from the standpoint of responsiveness and effectiveness to Omani needs over the long term. Because the time requirements are long and the rate of success, particularly in achieving Ph.D. degrees, is not high, an exceptionally long lead time is necessary for this education. Typically six to eight years of study and research beyond the B.S. degree are required for a Ph.D. Further, while the freshly graduated Ph.D. is qualified to plan and conduct research or to develop and teach university courses, he may not be qualified to head departments, laboratories or research sections without additional experience. Although Ph.D. level education is desirable, it is recognized that M.S. training

for Omanis is a logical procedure initially for placing people in many research and some teaching positions. Attraction and selection of persons who are well-qualified is an essential part of the educational process, and a part that should be strengthened. Through public education the importance of the fishery sector to Oman can be promoted and the prestige of employment in the sector can hopefully be increased.

The constraint caused by the lack of scientist, biologist and university is assigned a first level of priority. The future of the fishing industry rests upon the education of large numbers of youth to serve in the government and in industry. This education should be done eventually in Oman, with Omani teachers and faculty, but the process of education is time-consuming, particularly at the Ph.D. level required for college professors and senior researchers. This type of manpower commonly requires ten years of post-secondary school education and five years of professional experience. The time requirements make the early initiation of this process a very high priority.

3. Technicians, research assistants and mid-level DGF staff

Persons filling technical and mid-level posts and those available to fill such posts have not been trained to conduct their duties effectively. General understanding of the purposes of the work is often lacking and therefore undermines motivation to complete assignments thoroughly and effectively. Further, these staff members should be actively involved in planning, designing, modifying and analyzing their work. The DGF and MSFC simply cannot function properly without greater investment in training.

This constraint will hinder operations and program implementation of the DG/F. As DG/F leadership and management develop and begin to conceptualize and initiate sector development programs on a more wide scale basis, this constraint will become increasingly severe. However, given the quality and size of the DGF's present sector development programs, it is considered as a second-level priority constraint.

Mid-level staff for all sections of the DGF and assistants for the MSFC will benefit from various types of training. Hopefully, in the future these positions will be filled by graduates of the university. However, in the near term a large amount of mid-level staff training of various types will be required. Staff training will range from two-year, diploma level training in the U.S. with a designated area of specialization through study tours, short courses in-country, on-the-job training and training to master special techniques required in these positions. It will be highly desirable to build necessary training capacity in-country as soon as possible to reduce costs and time required for the training.

4. Fishermen, fish processors and industry support personnel

This final category of training needed relates to the fishing and fish marketing industry itself and the need to refine the trade skills of nearly all persons working in or planning to work in the sector. Generally, industry workers are not familiar with modern fishing and fish processing equipment or with its proper use. Only through the upgrading of industry equipment will the fishery products be competitive on world markets. The efficiency of industry workers can be multiplied several fold and the attractiveness of employment in the sector can be enhanced through training. This task is a large one. The objectives will be to upgrade the trade skills of thousands of traditional fishermen, to develop skills for roughly equal numbers of tradesmen in supporting industries, and to prepare young Omanis for rewarding careers in the fishing industry.

The welfare of skilled industry workers is directly linked to his productivity and that to his skills and competence. The upgrading and development of the industry is therefore closely linked with worker training.

Only a national training/extension capability can address this task. In addition, it will probably be necessary to address the problem through a multifaceted approach including vocational schools, publications, media campaigns, traditional extension methods, demonstrations, seminars, short courses and other methods.

C. Private Sector Growth

1. Ports and harbors

A basic requirement for efficient harvesting and marketing of marine resources is the ability to land products soon after harvesting and to move them quickly to markets. Transport at sea is slow, therefore ports must be placed near primary fishing grounds. In addition, port facilities must be large enough to handle peaks of production arising from the collective action of a mobile fleet harvesting migratory fish stocks that will, on occasion, be highly concentrated and vulnerable to capture in large tonnages. Oman has only a few ports with limited capacity and that capacity is already largely utilized. The fishing industry today is based primarily upon traditional fishermen using about 7,000 skiffs that are hauled onto the beach following each fishing trip. This limits the fishermen to small boats of limited-range, capacity and seaworthiness. Before the industry can expand significantly with a shore-based fleet, large investments in ports and supporting facilities will be required.

An alternative option (harvesting fishery resources with a high-seas fleet and processing aboard factory motherships,) is not attractive for Oman in the long term because such an industry would have greatly reduced benefits for the country. In the short term, however, it may be more attractive than not harvesting resources. The planning and design of port facilities must be given careful attention to ensure: (1) that port capacities and fish storage capacities match likely expansion of the industry, (2) that essential utilities (water, sewer, electricity) are expanded to service the requirement of the fishing industry and the enlarged community resulting from the new ports, (3) that consideration be given to new supporting and auxiliary private sector industries that will develop because of the fishing industry and port; and (4) that vessel construction and dry docking facilities be included in port designs to match vessel requirements of industry expansion. It is estimated that it will be at least three years before the first new port facilities are available, and most new construction will be two or more years beyond that.

Major expansion of the private sector with larger boats is dependent upon the availability of improved docking and servicing facilities since these boats cannot be landed on the beach. The lead time for design studies, financing and construction is long; hence, this constraint is considered a second-level constraint.

2. Vessel construction and repair

As few Omani-owned fishing vessels of major size exist, the country does not have adequate construction or repair facilities (including marine ways, dry docks and engine repair facilities) to serve an expanded sector. This is a critical aspect of port facilities that requires large investments. An option is to buy vessels from outside the country, thereby reducing the specific requirements for construction. This step would mean bypassing an industrial opportunity for Oman and would reduce some of the industrial benefits associated with expansion of the fishing industry. Furthermore, foreign repair facilities would be prohibitively expensive and complicated.

Until new port facilities are available vessel services will not be in great demand. Nevertheless, it is assumed that some expansion of larger vessel use will occur and that vessel services will be increasingly in demand. This constraint is considered as a third level of priority.

3. Fish processing and storage facilities

Limited freezing, cold storage, ice production and fish processing facilities exist in Oman. They are inadequate to handle the current annual 100,000 ton catch and are

scattered along the coast. Some facilities have fallen into disuse for various reasons. As Oman steps into world fish markets on a competitive basis, the industry must make major strides in improving the quality of fish marketed. For this purpose expansion of processing and storage facilities will be required. Because of the nature of fishing and fish landings an excess capacity is required to handle large seasonal peaks in particular regions.

Required are facilities for ice production, quick freezing and frozen storage, fish filleting and dressing, packaging, and, depending upon economic factors, perhaps canning, salting, smoking, de-boning, drying, meal and oil manufacture and production of other specialty products.

Existing facilities are inadequate for the industry today. Fish are marketed, but at a lower price than would otherwise be possible. This is closely linked to product quality.

This constraint will primarily affect private sector operations and is expected to be alleviated primarily by private sector investments. Given the other constraints blocking private sector growth and investment, this constraint is given a third level of priority.

4. Loss of product quality

The marine products harvested from Oman's coastal waters are of excellent quality and could command top prices on any Japanese, American or European markets. These wholesale prices are from \$6 to \$20 or more per kilogram depending upon the variety and degree of dressing. Unfortunately, drastic losses of product quality are incurred between harvesting and marketing. These losses are so severe that Omani fishery products now have an inferior reputation on many world markets (lobsters are a prime example). Needless to say a drastic decline in value accompanies this quality loss.

Reasons for the failure to follow generally accepted fish handling procedures are both traditional and technical. Traditionally fishermen have not carried ice in their boats and traditionally fish considered to be of low quality on world markets have found buyers in the interior of Oman and in the Arabian Gulf countries. Technically, the fishermen, fish dealers and exporters have not had a firm understanding of procedures required to preserve the quality (and value) of Oman's fishery products.

At present these losses may equal the value of the catch. The industry obviously can operate without good quality control; nevertheless, the potential impact of relatively small development is so large it is not easy to understand the acceptance of current practices. This constraint is considered a

second-level constraint considering the value lost due to this constraint and the limited investment it would require to be substantially reduced.

To realize full value of exported products standard techniques for handling fish on boats and ashore and for preserving, holding, processing and shipping must be introduced to the industry. Industry-wide enforcement of a standard code of practice may be required to make this transition and to avoid the large financial losses being incurred by the country through poor fish handling procedures.

D. Institutional

1. Policies regarding development of the fishing industry

The private sector requires a stable investment climate for its development and is not likely to take the risks related to financial investments until such stability exists. At present the private sector is hesitant because Government policies regarding several aspects of the fishing industry are lacking, uncertain or discouraging to private sector risk taking. Government policies with regard to public sector companies are not clear. A new parastatal or quasi-public company, The Oman Fishing Company, has been formed to replace the Oman National Fishing Company. Its current and future rights and privileges with regard to fishery resources, fishing vessels, methods and marketing of products, and its role vis-a-vis the private sector are not apparent. Further the options open to the private sector, including traditional fishermen, in terms of introducing new, larger fishing vessels to fish in Oman waters are uncertain. Government long-term policies in relation to foreign fishing in Omani waters have not been clarified. Until these matters have been decided and publicly announced, the level and type of competition facing the private sector is uncertain and investment plans cannot be made.

The lack of clear, consistent policies regarding development of the fishing industry is a high priority constraint. This factor has seriously impeded modernization of the industry and any development by the private sector. The impression is given that DGF will favor OFC over the private sector. Until action is taken on policies, little progress will be possible on seven of the eight Government goals for the sector.

2. Legal framework for the fishing industry

Private sector utilization of common property resources can be sustained only under strict control and regulation based on a legal framework applied judiciously and uniformly to all participants in the sector. The general legal framework for the Oman fisheries sector exists and the Minister

of Agriculture and Fisheries has authority to issue rules and regulations for the rational management of the resources. Relatively few regulations regarding fishing zones, quotas, seasons or size limits exist as resource information available for most fish stocks is insufficient to allow development of useful regulations.

Concerns of the private sector are that regulations will not be developed and enforced to prevent overexploitation and destruction of resources. Assurance of long-term resource availability and of industry stability provided by prudent regulations are prerequisites for private sector investment.

Regulation of a fishing industry is an absolutely essential part of resource management in order to sustain harvests. Lack of regulations will result in destruction of resources (probably first by foreign fleets). Institution of an effective legal framework, judiciously and uniformly applied, will depend on having in place a stronger public sector management capacity and will encourage the growth of a private fishing industry. Given these linkages, it is considered as a secondary-level constraint.

3. Enforcement of regulations

Having a solid regulatory base for the fishing industry also requires a strict and equitable enforcement capability. Little law enforcement has occurred to date. Blatant violations of some existing regulations are taking place, (e.g. harvest of lobsters with tangle nets and sale of undersize lobsters). Some foreign vessels are suspected of fishing too close to shore and other foreign vessels apparently fish illegally in Oman's extended economic zone. A strong industry cannot develop in an atmosphere of uncertainty regarding law enforcement.

Responsibility for law enforcement rests with the DGF. The actual implementation of enforcement measures should be clearly assigned to an Omani agency (possibly the Royal Oman Police) and appropriate officers should be familiarized with fishing regulations. Some training of officers in recognition of fish species, fish size measurement, net mesh measurement techniques, and fishing gear types. The responsible agency must also have a sea-going ability, perhaps with both vessels and aircraft, and means for determining suspect vessels' precise positions at sea.

It should be appreciated that this is a specialized responsibility requiring the participation of trained law enforcement officers. Actual law enforcement measures should not be, therefore, undertaken by the DGF, and mechanisms should be devised to guard against "interpretation" of the law other than by due process. OAJC training of law enforcement officers

in either fishery-related or enforcement-related aspects of their duties may be possible through appropriate consultancies.

The final step in the regulatory process is adoption of standard, uniformly applied procedures for presentation of evidence to the appropriate judicial body, presentation of a defense by the accused, determination of guilt or innocence, and prescription of penalties.

Enforcement makes regulations meaningful to the resource users, and consequently is as important as the regulations themselves. Enforcement shortcomings are considered a secondary level constraint.

4. Communication

Avenues for communication among government agencies and between government and the private sector are weak with respect to the fisheries industry. Both government and industry will benefit from the support and assistance of the other; however, existing cooperation appears to be inadequate and suitable mechanisms for presenting views, plans and concerns do not seem to be operating, even though they have been established by Decree. For example, full utilization of bodies such as the presently inactive Council for Living Marine Resources Management and its full range of working groups is necessary. The private sector should also establish a working group of its own to aid in voicing its concerns to government in a coherent and unified fashion.

Lack of communication increases inefficiency and confusion among government agencies. Without more open exchanges with the private sector the level of conflict with government agencies, including OFC, will soon escalate. This constraint cannot be separated from the previous three and the magnitude of the problem is equal to the potential for new private sector development. It is considered as a secondary-level constraint.

5. Extension of new technology

Every element of the fishing industry and the fish processing and marketing industry can benefit substantially from the transfer of technology and the learning of methods and technologies that are widely applied around the world. The fishing industry of Oman currently utilizes simple and inefficient methods and poor product handling, and has been exposed to few of the productivity increasing technologies used by most fishermen in other countries to increase their incomes. Application of new technology is necessary to upgrade the welfare of fishermen, to produce seafood efficiently and economically for internal consumption and for export, and to realize the full benefits of Oman's marine wealth for the country.

The existing extension organization is very small and functions poorly in spite of highly professional technical assistance provided by OAJC under the previous project. The traditional one-on-one field approach to fishermen has been followed in the past; however, logistical problems relating to the size of the country and the number of traditional fishermen (13,000) scattered widely along the coast have raised questions regarding the adequacy of this approach. Because of the magnitude of the problem of upgrading the performance of a large but outdated industry, a revised approach is recommended which would utilize a combination of training, public education and extension methodologies. A high degree of innovativeness will be required to accomplish this task rapidly and economically.

Improvement of the efficiency, productivity and safety of fishermen has not been given high priority by DGF in spite of its officially recognized importance. A greater understanding and stronger commitment to extension by DGF are vital to the process of achieving meaningful results in the fisheries sector. However, as the successful introduction of new technologies in the fishing industry will require considerable program and policy development, this constraint has been assigned a third level of priority.

E. Information and Knowledge Gaps

1. Determining sustainable yields for key fish stocks

The DGF urgently needs reasonable estimates of the magnitude of sustainable yields for major fish stocks in Oman's coastal waters. Until these estimates are available the DGF has little basis upon which to plan and develop the industry. Such estimates can be made with increasing reliability on the basis of a growing mass of scientific information (collected through the fishery landing statistics system, on-board observers, and biological data gathered directly by researchers on individual stocks). The accuracy of the estimates will continue to improve after routine statistical collection procedures are instituted.

The urgency of circumstances confronting the DGF with regard to development of fleets and setting of target catch quotas calls for obtaining the best available scientific estimates of stock yields as a matter of top priority for the MSFC. Accordingly, it is recommended that the full attention of the A.I.D.-supported scientific team be directed to provision of first-order estimates of sustainable yields for major stocks within the next few years. This will require a shift to a more task-oriented approach for the A.I.D.-supported scientists and an ability to shift from task to task in response to DGF needs. It is believed that this approach will provide a more realistic model for government research laboratory programming than the

current approach. Further, it is felt that the institution-building objectives can be accomplished following this approach in a fully satisfactory fashion. Priority will be placed on task-oriented problem-solving, and institution-building accomplishments will follow.

The task-oriented approach will not preclude building of long-term data bases on fish stocks. In fact, stock assessment research and the landing statistics program should be much more closely connected and coordinated.

First-order yield estimates have been made, or will soon be made, for lobster, abalone and kingfish. Species groups of greatest importance will be (1) demersal species subject to the trawl fishery, (2) tunas on a species by species basis and (3) small pelagics (with sardines of greatest immediate concern).

Determination of sustainable yields for demersals has been given highest priority among stock assessment needs because the trawl fishery (foreign and OFC) is being expanded without firm knowledge of sustainable yields. It is also, perhaps, the most difficult and time-consuming stock assessment task being addressed because of the many species involved.

Tuna resources are large, migratory and are likely being fished by other nations as well as Oman. Oman should document, through research, the impact of its fishery on stocks and perhaps expand its share of the international catch to establish a basis for future negotiations with other fishing nations using the resources. While the research can be postponed without influencing catches, it is not wise to do so. (Pressure to introduce purse seining for tunas can be expected soon.)

There is no indication of overfishing on sardines or other small pelagic stocks; nevertheless, without better stock assessment research the potential for expansion for frozen fish or fish meal markets is unknown.

2. Short-term biological studies

A second line of biological information needed by DGF for resource management relates to better understanding of the migrations, reproductive habits, distribution and related specific biological information, as it pertains to fishing and maintenance of productive stocks. The focus of this research should be on subjects filling information gaps concerning harvesting efficiency, increasing harvests or improving management practices.

Several types of special studies will be particularly useful with regard to specific management decisions. The lack of information will delay useful management decisions.

This constraint is considered to be of secondary importance and of a lesser relative importance than the stock assessment.

3. Economic analysis

Common property resource economics is distinctive in many ways and poses a set of special problems for economists. When the free entry aspect of fisheries is added the complexities are increased and it is common for developing fisheries to encounter a number of economic pitfalls.

The DGF has very limited capability to address issues such as overcapitalization, feasibility of new industries (e.g. fish meal), the impact of parastatals on the private sector or the impact of subsidies. Economic research was an early element of the previous project, but was dropped because the prevailing level of staff education with regard to resource economics was too low to make good use of this important resource.

As DGF staff education and training progresses, efforts should be renewed to introduce a capability for economic research and analysis. Large economic losses can be predicted through the lack of thorough economic research and analysis capability. An economist should be assigned to the DGF as close as possible to the Director General, so that informal interaction with the Director General and with his closest advisors is possible on a regular basis. The economic analyses and advice of the economist should also be freely available to interested participants in the private sector.

Background economic research and analyses can be especially valuable to the nation in guiding its resource management policies. For example, in many fisheries of the world the number of vessels used to harvest the catch is at least double the amount required. Economic losses to the country could be large. The constraint represented by the lack of economic analysis is given a secondary level of priority.

4. Fishery statistics

A comprehensive, dependable and accurate system for gathering and reporting information on the volume, species and locations of fish landings, together with the measurement of statistics of the industry, is the basic analytical tool of fishery management. Without a continuous flow of sound and extensive fishery statistics, progressive resource management is not possible.

An excellent statistical system has been designed and implemented under the previous project. Operationally the system is very weak because of inadequate DGF allocation of financial, logistical and staffing support. Consequently, the basic input into the system (data collected in

the field by statistical agents) is currently of low quality. Leadership in DGF and the Ministry of Agriculture and Fisheries must be persuaded that a strong system is essential and that the present system is not adequate. Highly trained foreign experts should not be used to staff the numerous field sampler positions or to supervise the samplers.

This constraint is placed in the highest priority category because basic statistics on the industry and its performance are the knowledge base for successful management. The importance of a solid base of statistical information is such

that delays in establishing the base will delay effective management.

Continuing assistance with the statistical program will be required to expand and strengthen it. Demonstrations of the usefulness of the system, and of the critical need to support it properly, will be objectives of the project inputs. The full staffing by Omanis is an important objective.

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III. Actors and Institutions

A. Private Sector

1. Fishing industry structure

a. Artisanal

The artisanal fishing industry which lands 90% of Oman's fish harvest consists of 13,000 fishermen as many as half of whom are part-time fishermen. They utilize small boats (23 ft. or less) and outboard motors, and land their boats on the beach throughout the length of Oman's coast. These fishermen utilize hand-operated gear of various types, typically carry no ice and land fish in small amounts because of their limited weight capacity. They are distributed among the regions of Oman as follows:

Musandam	1,063
Batinah	4,076
Capital	1,292
N. Sharqiya	4,011
S. Sharqiya	1,758
Dhofar	1,314

Some fishermen fish from motorized dhows using larger nets; however, the scarcity of Omani fishermen willing to crew these boats is resulting in a reduction of dhow fishing.

Fishermen's incomes are reported to be satisfactory in terms of their modest needs; however, few young men are entering the profession, and older men stop fishing at about age 50.

Fish are marketed primarily through some 800 buyer-truckers who travel the beaches with pickup trucks. Some fish are sold to Government or private freezing plants in coastal communities.

b. Foreign

A fleet of seven Korean trawlers are fishing offshore under an agreement with the Government. Vessels are foreign owned and operated. Benefit to Oman realized from this fishing operation is a share of the catch landed with and marketed by the Oman National Fishing Company (ONFC). In 1987, 2,861 tons (or 26%) of the 10,056-ton harvest were turned over to ONFC. This fishing agreement will expire in January 1989.

No other foreign fishing is documented in Oman's EEZ; however, it is probable that foreign vessels are fishing, at least occasionally, in Omani waters.

c. Modern national

No modern mid-sized or large, Omani-owned vessels participate in the fishery at the present time. Few requests for licensing of vessels of this type have been approved, and even in those rare instances (e.g. ONFC) it is reported that the requirement for manning the vessels with totally Omani crews has blocked operations.

The private sector is participating in the marketing of fish, together with ONFC, and several Omani companies operate freezing/cold storage facilities for this purpose.

2. Opportunities and constraints from the industry viewpoint

Based on even the most conservative estimates, the marine resources of Oman offer considerable potential for expansion of the fishing industry. World markets are demanding more high quality fish and are willing to pay increasingly higher prices for these products. The private sector view of the Oman fishery sector potential is understandably enthusiastic. Unfortunately, private sector awareness of this potential generally does not extend to the traditional fishermen, although they will certainly have an important role in new fishery development.

The optimism of the (basically underdeveloped) private sector is tempered by a range of uncertainties and concerns. These concerns are summarized in the MRAG report to include:

- "- the absence of clear Government policy
- the exact station and future of the ONFC
- the level and means of access to fishing licenses
- the level of access to ports' infrastructure
- the absence of a pool of skilled labor
- the absence of a mechanism to develop trained manpower
- restriction on the employment of expatriate labor
- the short period of the leases that have been made available for operation and management of the fisheries centers
- the relatively poor performance of the Directorate General of Fisheries in assisting the private sector to develop

- the presence and impact of subsidies within selected parts of the industry
- the widescale sale of subsidized frozen fish into the domestic market
- the drift of fishermen away from the larger sea-going dhows into their own small skiffs
- inadequate road access to fishing villages
- poor ports' facilities
- complex bureaucratic procedures for obtaining authorization for development projects."

Collectively these concerns constitute a major constraint to upgrading the traditional fishery and to establishing a modern fishing industry in Oman, with all its associated benefits.

B. Public Sector

1. Sector goals

The following targets and policies of the fisheries sector are stated in Oman's Third Five-Year Development Plan (1986-1990):

- (1) To assign top priority...to the development of the productivity of traditional fishermen;
- (2) To continue the support program which is implemented by the fishermen's fund;
- (3) To expand the construction of docking facilities needed for landing fishing boats;
- (4) To expand the construction of fish storage and marketing centers.

Other policy guidelines as well as the overall legal framework are analyzed in the Review of Policy Options and Proposals for Development, prepared by the Marine Resources Assessment Group, Ltd. in late 1987. Recommended National Fisheries Objectives include:

- (1) Diversify the national economy.
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- (2) Upgrade the economic, social and technical standards of the traditional fishermen.
- (3) Improve the nutritional standards of the people of Oman.
- (4) Present new investment in the fishing industry.
- (5) Continue the development of infrastructure.
- (6) Increase national revenue through fish export.

These goals are basically non-contradictory, and it is assumed that all are working goals of the Government.

2. Proposed sector objectives

In the Indicative Long-Term Fisheries Development Plan submitted to the DGF by Research Development Associates (late 1988) specific objectives are recommended to support the goals. These can be summarized as follows:

- to increase the level of exploitation of fishery resources within rational limits,
- to maximize value added through improved fish handling and processing,
- to expand infrastructure for traditional fishing,
- to provide financial support for upgrading and modernization of fishing craft and gear
- to demonstrate the viability of modern fishing craft and gear,
- to raise the social status of fishing occupations,
- to provide expanded market outlets,
- to ensure the availability of high quality, reasonably priced fishery products throughout the country,
- to increase domestic demand for fishery products,
- to develop the Government's institutional capacity to manage national fisheries and regulate national exploitation of fishery resources.

3. Sector Policy Framework

Primary contributors to policy development are the Ministry of Agriculture and Fisheries and the Directorate General of Fisheries within that Ministry. A Planning

Directorate within the Ministry has a limited input. Interaction with other ministries and with the private sector are minimal, although the Council for Living Marine Resources Management was established for this purpose and would serve nicely if it were fully operational and functional. The policy framework today is incomplete and somewhat nebulous although it is actively evolving.

Apart from the general guidelines summarized in the Third Five-Year Plan and the recommendations contained in the MRAG and RDA Reports, no detailed fisheries policy has been articulated by the Government, although elements of such a policy are emerging. The MRAG report summarizes prevailing concerns of the Government that will likely be the basis for a policy and these have been quoted below. In addition, the MRAG calls for re-convening of the Council for Living Marine Resources Management to discuss and develop national policy as envisaged by Sultanlic Decree 15/81:

"- any exploitation of the national marine resource must be within sustainable limits - that conservation shall be the keyword for management;

- all planning for marine resources development may only be undertaken within the context of the best available scientific evidence on the extent of the fish stocks and the yield that they can sustainably supply;

- the traditional position and life style of coastal peoples who rely on fish for their livelihoods and nutrition shall not be undermined or replaced by an accelerated development towards maximizing the economic potential of the national marine resource; but that, where possible and where aspirations are known, traditional fishermen shall be directly involved in the growth of the fisheries industry;

- any private sector involvement shall recognize its participation strictly within the above framework while being encouraged by government to undertake business in the normal economic fashion; company competition being an essential element of commercial enterprise;

- all fisheries activities shall be conducted within the framework of the law, as declared through Sultanlic and Ministerial decree and any administrative and contractual arrangements entered into; and that it shall be recognized that these activities may be subject to change in support of necessary management and development measures; and

- coordination of activities in and between the private and public sectors is an essential element for maximizing benefits from living marine resources, but that this is currently frustrated by lack of procedural mechanisms, knowledge of

commercial policies and plans, and adequate information exchange."

The RDA report goes one step further and suggests wording for a comprehensive policy statement as follows:

"It shall be the policy of the Government of Oman that the fisheries resources of the Sultanate shall be exploited for the general benefit of the people of Oman. In pursuing the rational development of marine resources, the following guidelines shall be followed:

1. Exploitation of resources shall not exceed the maximum sustainable yield for each type of resource, as determined by the best available scientific evidence.
2. Harvesting, handling, processing and marketing shall be conducted in such a manner so as to maximize the value of the resource rather than the volume of landings.
3. The development of the fishing sector shall be based on the continued growth of the traditional fishermen. However, in the absence of an established traditional fishery for a specific stock of fish or shellfish, companies shall be licensed to exploit those stocks under regulations set forth by the Minister of Agriculture and Fisheries.
4. With the growth of the traditional fishermen and national industrial fishing companies all fishing activities after the year 2000 shall be owned and operated exclusively by Omani nationals. Prior to that time, Omani companies may be permitted by the Minister of Agriculture and Fisheries to engage in joint venture or charter arrangements with foreign fishing vessels. During this transition period, the companies and Government shall cooperate to train Omani fishermen to replace foreign nationals in a timely manner.
5. The Oman Fishing Company will serve as the focal point for development of non-traditional fisheries, but other companies are not precluded from pursuing fishing, processing, or marketing activities as permitted by the Minister of Agriculture and Fisheries. A complementary, yet competitive, business environment within the fisheries sector is to be encouraged.
6. Marketing companies shall be expected to export high quality, value-added seafood products and shall adhere to standards established by the Government of Oman and/or requirements of importers.
7. The Government of Oman shall foster the development of the fisheries sector by:

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a. providing assistance to the traditional fishermen in the form of infrastructure development, training programs, demonstration of more efficient boats and equipment, and financial assistance to those fishermen willing to expand their horizons;

b. providing assistance to the private sector in the form of access to information and financing;

c. protecting the long-term viability of the resource through proper management."

Overall these goals, objectives and policy ideas are sound. They do not, however, adequately address several major controversial issues facing the fisheries sector:

(1) Policies ensuring adequate support for governmental activities in support of the industry, e.g. extension, statistics, research and law enforcement,

(2) Policies regarding the future role of foreign fishermen, vessels, companies and joint ventures,

(3) Policies ensuring comprehensive, equitable enforcement of the national laws and fishing regulations of Oman,

(4) Policies clearly identifying the opportunities for traditional fishermen in terms of larger vessels and more effective gear,

(5) Policies regarding opportunities for new business (fishing) enterprise utilizing modern vessels and gear,

(6) Policies regarding the role and purposes of parastatal fishing companies in terms of national goals, potential conflicts with the private sector, and resolutions of those conflicts,

(7) Policies regarding limited entry into the fisheries of Oman to prevent overcapitalization and economic overfishing.

4. Regulatory framework

A broad regulatory framework is in place (see section II.D.2. above) granting authority for regulation of the sector and assigning responsibility to the Ministry of Agriculture and Fisheries. Beyond that only a few regulations have been formalized and those are poorly enforced. Mechanisms are in place but responsible actions have not been taken. The private sector does not have an understanding of the conditions under which it can expand (e.g. licensing requirements, fishermen's and industry rights, quotas or allowable catches or of the regulations pertaining to the operation of the OFC and how they will influence private sector operations). Further they do not have confidence that new or existing regulations will be

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enforced sufficiently to protect resources from overexploitation. Both lobster and abalone fisheries are now apparently being overexploited in a fashion that will lead to a decline in resource productivity, and the Government appears hesitant to take corrective regulatory and enforcement action.

5. Government assistance to private sector

Government assistance has been provided through subsidies for fiberglass boats and outboard motors utilized by the traditional fishermen. Terms have been attractive, utilization has been high as is indicated by the fact that all fishing boats have now been motorized, and the repayment rate has been good. This subsidy program is continuing.

Government owned ice/freezing/cold storage facilities have been leased to the private sector on a short-term basis for minimal fees. This form of assistance has been instrumental in the establishment of several private sector marketing firms.

Finally, the DGF, with assistance from A.I.D. has provided several forms of assistance to the private sector through its extension and marketing activities. A small dispensed extension activity has promoted improved fishing methods, fish handling and safety at sea among traditional fishermen. Information on marketing and on improved techniques for handling and marketing fish has also been provided to the private sector.

6. Impact of public policies, regulations and programs

Government policy supporting development of OFC, at best, limits the scope of new private sector development. Depending upon the future decisions and concessions of the Government with regard to OFC, it could largely inhibit new private sector business. The DGF practice, reflecting an unstated policy of severely restricting issuance of licenses to private sector enterprises, is completely blocking modernization of the industry. The greatest impasse in the policy area arises from the failure of the Ministry and the DGF to articulate and publicize clear policies regarding the fishing sector. This creates a large measure of uncertainty with regard to Government plans for the private sector, thereby inhibiting private investment and fisheries development generally.

7. Mechanisms for communication

The Council for Living Marine Resources Management was created by Sultanic Decree as a mechanism for communication and coordination, both among governmental agencies and between government and industry. Membership on the Council includes the Minister of Agriculture and Fisheries, the President

of the Chamber of Commerce, representatives of ten other ministries, Director Generals of the Oman Bank for Agriculture and Fisheries and of the Oman Development Bank, as well as the following private sector representatives: two from investment institutions, two from private fishing companies, two from fish trading companies and six fishermen's spokesmen. It was envisioned that working groups of the Council would be established to address specific issues and problems.

To date the Council has not functioned in accord with the Sultan's Decree. For example, non-governmental participation has not occurred. The Council is an important and much needed means for improving communication and will serve this important role well if it is allowed to operate as it was designed.

The private sector is composed of traditional fishermen and entrepreneurs who are not organized and who cannot speak with a single voice. A considered recommendation is that private sector interests, including those not yet participating in the sector, organize to form a formal association that is able to interact with government agencies (e.g. the Council) with some strength and authority.

C. Parastatal or Quasi-Public Enterprises

1. Impact on the private sector

The existing Oman National Fish Company (ONFC) is being incorporated into a new Oman Fishing Company (OFC). The ONFC has played two roles, the marketing of Oman's share of the Korean vessel, joint venture catch and operation of cold stores including marketing of fishery products purchased from some Omani fishermen. The OFC is being formed currently and will differ from ONFC in several aspects. First, all Government cold stores will be turned over to OFC. Secondly, OFC will have exclusive rights to fish in given areas and to harvest given fish stocks as defined in concessionary agreements with the Government. These fishing zones are largely offshore rather than in the areas traditionally fished by artisanal fishermen, and, in addition, traditional fishermen are not excluded from the concession areas. According to the OFC charter it can carry out fishing, processing, freezing, packing, packaging, purchasing and marketing operations as well as establishing and running associated fisheries industries. Concession agreements are to be re-negotiated annually.

2. Future role in Oman

To date it is not clear exactly how OFC will operate or specifically what commercial activities it will undertake. The impact on the private sector cannot, therefore, be determined at this time. Most likely to be affected are those firms currently leasing Government-owned cold stores and the

investment/new business interests that are hoping to participate but are not yet doing so. Traditional fishermen who may purchase larger boats in the future (if licensing policies permit) will be able to fish in concessionary zones, but may, of course, be competing with other OFC concessionaries.

Until the plans and activities of OFC are more fully developed, private sector plans are being held in abeyance pending clarification of OFC's role.

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PART IV. Project Sector Development and Action Plan

A. Project Goals and Objectives

Project goals are identified with the following national goals:

1. Diversification of non-oil sources of incomes and revenue,
2. Conservation of the fishery resources of Oman to ensure optimum sustainability of yields,
3. Development of human resources to enable Omanis to participate fully in the sector (Omanization),
4. Encouragement of the private sector.

To accomplish these goals the project is being designed to address a specific set of objectives:

1. To enhance the economic development of fishermen and of the fishing sector of Oman,
2. To expand the training and education of persons involved in the private sector and in governmental support agencies,
3. To strengthen fisheries research and fisheries management institutions in the country,
4. To support development of necessary infrastructure,
5. To establish necessary biological information on fish stocks to determine optimum sustainable yields,
6. To address information needs of the private sector, and
7. To assist the development and articulation of Government policies regarding the fisheries sector.

B. Role of other donors in the sector

Only two other donors have a known interest in the fisheries sector: Germany and the United Kingdom. Germany is assisting with the planning and design of ports and harbors and may be a contributor to construction of new port facilities. The United Kingdom provides some scholarships to selected outstanding Omanis to study in Britain and some scholarships are

marine science or fisheries oriented. The U.K. has also assisted on occasion with special studies in the fisheries sector.

D. Host country Sector Priorities

The Government of Oman has a primary role to play in addressing virtually every constraint identified. The magnitude of the task facing the DGF in resolving the many problems facing the new industry calls attention to the urgency of increased overall support for DGF by the rest of the Government. Without a renewed and increased commitment the total task cannot be accomplished.

With regard to the highest priority constraints DGF must identify and hire outstanding leaders. An excuse often heard is that fisheries is not a prestigious profession in Oman, but perceptions can change through training and demonstration of meaningful results. Sultan Qaboos University staff should be encouraged to staff its fisheries teaching positions in the immediate future. Government policies with regard to the fishing industry must be articulated and publicized. The legal framework must be completed by Government and better provision made for enforcement of conservation laws and regulations. Donors cannot perform the communication roles that are so badly needed and which are the responsibility of the Government. Increased staffing, support and assistance for the statistics program will be required from DGF. Finally, at this and other levels counterparts must be available in numbers to work with expatriate experts.

Other priorities to be addressed will call for DGF hiring and supporting numbers of mid-level personnel with good potential. Mobilization of funding for port and harbor development will be largely Government responsibility, entailing participation of private entrepreneurs and possibly that of the World Bank, other agencies of the United Nations system, and bilateral donors. Support for quality control standards and enforcement of these standards will be required. At the scientific level (MSFC) increased funding and assistance from DGF are required as well as additional manpower and positions.

Encouragement of the private sector with permits, licenses and advice in building industry infrastructure will expedite progress. The Government should work to minimize unfair competition with the private sector by OFC. The extension systems require major new input from DGF including trained personnel, vehicles, vessels, and support in resolving bureaucratic problems.

B. Program Strategies

The overall project strategy is to assist Government and private sector in the modernization and sound expansion of the fishing industry through: (1) education and training at all

levels, (2) major policy interaction, particularly with regard to the private sector role, (3) direct services to the DGF to assist with data analysis and research and to temporarily staff programs until trained Omanis are available, and (4) counterpart on-the-job training to promote Omanization of the DGF. Details of the strategy can best be discussed by looking separately at public policy formulation, program planning, licensing, regulation and enforcement, fishery development services, resource management information, program management and promotion of the private sector.

Public policy formulation is a key component of the project strategy for the sector and perhaps one of the most difficult to address. Very conservative approaches and the lack of clearly stated government policies have inhibited expansion and modernization of the fisheries sector. Unstated policies may even have favored parastatal companies over the private sector. The project will address policy issues both indirectly and directly. A number of well-prepared Omanis will be educated and trained in the theory and practice of fishery management, and will be fully exposed to private sector activities and to government policies and relationships to the private sector in the U.S. and/or elsewhere. Also, direct counterpart training of DGF staff by project experts will continuously involve policy-related discussions. Project personnel will strengthen procedures and practices of communication between the government and the private sector, including enhancement of private sector feedback about government actions and policies. The availability, over time, of increasingly accurate information on the levels of sustainable yields from fish stocks will facilitate refined DGF management and related policy decisions. Directly, the project team leader, project experts and special consultants will interact with DGF and Ministry leaders to encourage policy dialogue. Assistance from a senior economist will strengthen project input into policy formulation. This integrated approach to public policy issues will combine immediate interaction with government leaders and long-term building of a well-educated staff able to articulate considered policy recommendations and their implementation.

Program planning is a recognized area of serious weakness within the DGF. In agencies where all players are relatively inexperienced and where roles and purposes of government organizations with regard to the fisheries sector are still in a state of flux and uncertainty, program planning is understandably difficult. The project's strategy for action to address this weakness will include long-term education and exposure of mid-level staff to program planning practices, as well as direct interaction of project experts with DGF and MSFC leadership in the planning of programs. An administrative analysis being conducted by Arthur Andersen & Co. is expected to increase understanding of this issue and to propose steps to improve performance. Flexibility and persistence are required to build institutional capabilities over time as various components

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of the project come together. Nearly all project outputs will enhance government planning capabilities.

Licensing, regulation and enforcement are critical areas to be addressed, for which a project strategy is important. For purposes of this discussion, regulation (including licensing,) is treated separately from enforcement.

The authority for regulation of the fishing industry is clearly delegated to the Ministry of Agriculture and Fisheries by Sultanlic Decrees. A prerequisite for the issuance of effective rules and regulations is a technical appreciation of (1) the resources being harvested, (2) the industrial impact on present and future marine resources, and (3) the probable net effect of various regulations under consideration. The strategy for bringing together the necessary knowledge base and building institutional capabilities includes research to define and describe resources at the MSFC, improvement and expansion of a statistical system of data collection on the fishery, and ongoing education and training related to fishery management methods. Economic analyses provided through the project will be an important aspect of predicting the impact of regulatory alternatives.

The importance of a complete, well-enforced set of regulations to protect the traditional fishermen, their livelihoods, and the marine resources of Oman generally, cannot be overstated.

Regulations have little value unless they are enforced, and effective enforcement will entail both a special Omani seagoing law enforcement capability and the political will to apprehend and prosecute violators of regulations. The penalties must be large enough to constitute a real deterrent. To date the government has appeared reluctant to enforce fishing regulations either for foreign or domestic vessels. It is possible that the project, through consultants or US Government agencies (e.g. the U.S. Coast Guard), could assist with training or procedural matters if assistance is requested by the appropriate law enforcement body. Alternatively, the Government might wish to approach other bilateral donors for assistance in strengthening its enforcement capabilities.

Project strategy directed to policy dialogue and its articulation is likely to be of more pressing concern in the initial stage. Policy dialogues and short-term training opportunities of many types will be envisaged. Policy discussions with the private sector should also help to promote recognition of fundamental importance of law enforcement to protect vulnerable marine resources.

Resource management information (consisting of existing results of biological and economic research and fishing industry statistics) is still inadequate even though some

information is now being compiled. The time required to build adequate historical and scientific databases is long, and industry statistics become more valuable as the period of time covered increases. The project strategy here is to strengthen DGF capabilities, standardize procedures, and emphasize the importance of valid statistical information. A permanent DGF system of data collection will be one vital project output. By making MSFC results more useful and timely, stronger support for research can be generated. A responsive, task-oriented research program at the MSFC (increasingly involving Omanis in all levels of responsibility and receiving stronger financial support from the Ministry) will reflect successful implementation of the strategy. Stronger linkages between research at MSFC and the DGF statistical system are imperative.

The strategy for promotion of the private sector involves, first, the full implementation of the Council for Marine Resources Management as an avenue for private sector communication with the government. It also involves strong efforts on the part of experts and the OAJC to influence policies that impact on the private sector through dialogue with Ministry, DGF and other high-ranking government officials. Better resource, economic and business information will be provided to support policy goals. Both long-term and short-term training will be designed to provide exposure to private sectors in other countries. The full benefits of the private sector approach in terms of Omani resource mobilization, employment, efficiency, competition on international markets, and stimulation of private investment, individual initiative, and benefits for the traditional fishermen and to the nation will be discussed and emphasized. Feasibility studies of private sector proposals will also be undertaken under the project to stimulate interest and to provide information required for investment analyses by private sector firms. Examples might include deep water trawling, fish oil and meal production, and fresh and frozen fish marketing overseas.

D. Institutional Deficiencies

Many of the constraints summarized in Table 1 are institutional deficiencies, and the overriding one (the lack of educated, skilled and trained human resources) is being addressed as one of the main objectives of this project. There are additional problems of organizational nature which must be addressed if the fisheries sector is to develop in a reasonable way and if this project is to be effective. Corrective steps to overcome these problems may, in some cases, be necessary before project implementation can proceed. Others are of a nature that will require long-term effort over the project life and beyond.

1. Overall Government support for fisheries Development

Considering the priority given to fisheries

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development by Sultanlic Decrees, there is a surprising lack of financial support and institutional commitment to this sector. The prevailing lack of support is illustrated by the decline in numbers of fisheries professors at Sultan Qaboos University (from three to one) and the failure to fill six fisheries teaching vacancies at the same university. It is also illustrated by the lack of financial and staffing support for DGF and MSFC. Shortages of equipment, supplies, vehicles and personnel continually constrain action and work progress within DGF. The present level of support for the sector is clearly inadequate. Without a stronger, more meaningful commitment to the fisheries sector, this project may only be implemented partially, and many important opportunities for manpower development and enhanced national income may be lost.

2. DGF extension program

A special case illustrating the lack of official support is the weakness of the extension/training activity services responsible for assisting traditional fishermen and other private members of the fishing industry. Highly trained extension experts financed by the previous fisheries project have only had limited impact because they were assigned to a frail, poorly supported counterpart organization.

It is important for the Ministry and DGF to demonstrate an increased commitment to extension/training and to provide strong enough support to overcome petty problems that have virtually incapacitated this vital activity. For example, a greater number of qualified extension agents must be recruited to staff the program fully and to work in counterpart training positions; vehicles must be available when needed; restrictions on project-related vehicle use should be more flexible; and operational funds for fuel, supplies and equipment should be readily available.

3. DGF statistics program

The statistics program is similar to the extension program in that DGF officials are apparently not convinced of its value and it does not receive adequate support. Again minor problems seriously limit its effectiveness, especially in the field, where data originate and some decisive action on the part of DGF is badly needed. As with the extension program, the project impact will be reduced unless DGF reforms are initiated (similar to those required for extension).

4. Fisheries education at Sultan Qaboos University

The staffing problems in the fisheries section of the School of Agriculture will have direct impact on the project. In summary, unless immediate additions are made to the teaching faculty, many fisheries courses will not be offered as planned, and the flow of fisheries graduates will not begin as

scheduled. Success of the project is dependent upon an ongoing supply of fisheries graduates from the university to fill staff positions. The single fisheries professor now at the university simply cannot handle the teaching loads originally scheduled for seven professors. Six faculty positions are open, but hiring procedures are very time-consuming. Serious efforts are needed to expedite hiring.

5. Licensing procedure for new vessels

The next logical step in fishery development is the use of larger vessels in order to increase catches from waters farther offshore than those frequented by the traditional dhows and motorized skiffs. However, few new licenses for vessels larger than the standard 23-ft. skiffs have been issued so far. Nor do there appear to be any guidelines or criteria established for how licenses are issued. While new larger vessels will, of course, require additional port facilities, it is difficult to understand why licensing has been so restricted in view of stated government goals for this sector.

6. Regulations and enforcement

Lack of sufficient up-to-date regulation and enforcement capacity is a major problem. All efforts to develop and conserve the marine resources for the benefit of Oman will eventually come to naught if appropriate action is not initiated soon in this vital area.

7. Managerial/administrative skills

Throughout the DGF, managerial and administrative capabilities are in short supply, resulting in inefficiency, unnecessary bureaucratic obstacles, and other manifestations of human resources underutilization that incapacitate the DGF's ability to play an important role in fisheries development. Many improvements could be made through short-term managerial training of dynamic leaders as well as highly motivated candidates for future leadership positions.

8. Communication

An underlying, crosscutting deficiency contributing to many of the above institutional problems is a failure to communicate candidly and freely between government agencies and with the private sector. Decisions and their underlying rationale tend not to be explained or discussed openly. Mechanisms have already been created to improve communications and to improve responsiveness to national public interests, but need to be utilized fully in order to improve the quality and timeliness of decision-making and thereby gain public support and confidence. One of the most important

mechanisms could be the (presently inoperative) Council for Living Marine Resource Management.

F. Expatriate Experts

1. Overseas training program (246 man years)
(To be elaborated by URI team.)
2. Statisticians (2)

A continuing technical assistance presence in the statistical program is felt to be essential to maintain momentum and to continue counterpart training. One senior statistician will be assigned to DGF headquarters in Muscat and a statistician will be assigned to Salalah.

The role of the senior statistician will be to assist and advise the leader of the DGF statistics section on all aspects of the management and operation of the section including field data collection, compilation and analysis, using computers, and publication of results. He will have no line authority and will give special attention to counterpart training and instruction of Omanis. He will be available to advise and assist senior staff of the DGF on matters concerning fishery statistics, analysis and uses of data. He will work closely with researchers at the MSFC to ensure that fishery statistics collected are of greatest possible value for stock assessment purposes and will work with his counterparts to improve data collection, including those of the on-board observers, procedures for this purpose when useful to the MSFC programs.

The statistician assigned to Salalah will support and assist the statistical program in the southern part of the country and will work closely with the Director of Fisheries in Salalah for that purpose. His duties will parallel those of the senior statistician stationed in Muscat.

3. Extension experts (6)

The extension program, properly staffed, funded and supported, is the key to the upgrading of the skills, equipment and incomes of traditional fishermen and to training of young Omanis for careers in the sector. Assistance is badly needed; yet, Government support for extension has been so weak that previous technical assistance through OAJC has had only little effect. Two important extension roles for technical assistance are: (1) strengthening the existing extension program by adding experts on extension methodology to the Muscat, Salalah and possibly Musandam extension offices; (2) assisting with the planning and design of a vocational training/extension program targeted particularly on preparing young well-motivated Omanis for careers in the field.

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It is not recommended that assistance for the first role be provided unless DGF is prepared to make a greater commitment to extension, including adequate staffing and logistical support (e.g. vehicles, fuel, supplies and operational flexibility for field extension agents). In the absence of increased commitment, the time and efforts of expatriate extension experts would be wasted.

The role of a senior extension expert (Muscat) would be to assist and advise the leader of the extension section in DGF. He would assist with implementation of the extension program suggesting modifications where appropriate to improve effectiveness. He would work closely with the section leader and with other counterpart personnel to improve understanding of modern extension methods. As opportunities occur, he would discuss with upper-level DGF officials ways to influence extension policy. He would cooperate with and assist the vocational training expert in his assignments.

The extension experts (in Salalah and possibly the Musandam) will assist with the management and oversight of extension activities in their regions. They will collaborate with the senior extension expert and work to ensure progressive development of the rotational extension system. They will interact with the DGF leadership in the region in introducing improved methods of fishing and fish processing and will help implement the field extension program through interaction with field agents and supervisory personnel.

A vocational training/extension expert would be assigned to DGF in Muscat specifically to plan and design the contributions of existing vocational institutes and the proposed fisheries vocational institute in accordance with the training needs of the fast-evolving fishing industry. This would be done from the extension section to ensure close coordination with other DGF extension training. Special attention will be given, in planning this training, to the specialized training needs of Omanis who will be employed in the fishing industry. Due consideration will be given to the roles of other nationals in the industry and to the need to build Omani-staffed training-extension capability. This expert will work closely with the extension team and will assist DGF and vocational schools in the implementation of the training programs. The term of this arrangement will be three years.

Larger vessels will require well-trained Omani operators. However, the need for a project-funded master fisherman and vessel captain to train Omani counterpart extension personnel for parallel roles and to demonstrate new methods is doubtful unless suitable, well-motivated counterpart personnel are selected for such training. It is recommended that recruitment of the master fisherman and vessel captain be deferred until a sufficient number of quality counterpart

personnel (perhaps 10) are assigned to the extension section for this purpose on a full-time basis.

4. Private sector and standards advisors (2)

Special assistance to the private sector via the DGF during the first six years of the project will occur in two ways. The first is through a private sector policy advisor to DGF and the second is through development of quality standards for Oman's fishery products and assistance to the industry in meeting these standards.

An economist/policy advisor will be provided to interact directly with Ministry and DGF officials on policy matters relating to the private sector. He will work closely with the Council for Living Marine Resource Management and with the policy and planning working group of the Council. In addition, he will interact closely with any private sector bodies that might evolve. He will utilize special studies, analyses and policy discussion papers to stimulate in-depth consideration of policies by DGF and the Ministry. This advisor should be an experienced fisheries economist, and he will conduct intensive economic research and analysis of the industry as a means for guiding industry development policies.

A fish quality standards expert will bring to DGF a strong background in fish handling and processing methods, quality requirements of foreign markets, and quality control standards, and methods of enforcement used elsewhere. He will work within DGF to develop a set of quality control standards for Oman and assist the industry in upgrading product handling and processing to meet those standards.

5. Research scientists (6-7)

A research team composed initially of six scientists and an advisor to the laboratory director will be placed in the MSFC to conduct task-oriented research and to train counterpart staff. The team will be phased down to two persons by the end of the eight-year project.

The advisor for research administration will serve as a special assistant to the Director of the MSFC. His responsibilities will be to introduce improved procedures and guidelines for research laboratory administration and management. His responsibilities will also include the role of Assistant Chief of Party. This part of his responsibilities will entail half his time. This position will have a term of three years.

The six research scientists assigned to the MSFC will be experienced researchers with strong stock assessment backgrounds who will address task-oriented research problems as assigned by the Director. Recommended research priorities, for the reasons outlined in Section II.E., include:

- (1) stock assessment of demersal species;
- (2) stock assessment of tuna species;
- (3) stock assessment of small pelagics with priority on sardines; and
- (4) short-term special biological studies.

The research conducted should be responsive to DGF interests and needs, and it should be planned in close collaboration with DGF. Special attention will be given to integration of the statistical sampling program with long-term monitoring of stock abundance. It is of paramount importance that research be organized to solve specific problems in response to management needs, rather than to establish disciplinary teams that will conduct descriptive research on a long-term basis. The short-term needs of DGF for management of stocks should take priority over more basic research or the academic interests of the scientific world.

6. Chief of Party

A senior administrator will be assigned as Chief of Party and will serve in the DGF offices in this role. His assignment will be for the full term of the project. In addition to management and coordination of the technical assistance team's role, he will be responsible for integration of the work of the experts into the DGF programs. He will serve as an advisor to the Director General and to the Minister, as well as to other high-level officials on request.

7. Consultants

Flexible, timely, and specialized expertise will be provided through the project's ability to draw upon a considerable amount of short-term consultants. Provision will be made to ensure maximum exposure of counterpart DGF personnel to such consultants during their assignments to Oman. Duties and length of tours will be defined as the needs require. Examples of special assistance might include planning and design for port and harbor development, stock assessment analysis, video taping or filming for extension training, biochemical analysis (e.g. electrophoretic analysis, shore processes studies related to harbor construction, on-board observer training, fisheries law enforcement training, computer modeling of fish stock - fishery interactions, vessel operation and navigation).

V. Implementation Plan

A. Contract

1. Terms of the contract

The length of service for the project is eight years beginning in 1989. A host country contract will be let for the initial three-year period, renewable for additional periods of three years and two years. Extensions will be subject to satisfactory performance and terms of the extension contracts are expected to be adjusted based upon evaluations of accomplishments and needs. In addition to the three-year detailed budget for the initial contract an indicative eight-year budget will be developed by the contractor.

A single contractor will provide the required services; however, subcontracting may be done by the contractor to provide the services. Timing of services provided, as outlined below, will be based upon detailed schedules provided by OAJC.

2. Scope of work

a. Training

The contractor will arrange for and handle costs of fisheries training for Omanis in the following categories:

	<u>person-months</u>
Ph.D. degrees at U.S. universities	_____
M.S. degrees at U.S. universities	_____
Diploma level (two-year) in U.S. -	_____
Technical short courses in U.S. or third country	_____
Study tours in various countries	_____
Short courses in Oman	_____

The contractor will provide the services of a full-time Training Coordinator who has broad experience in development-related training as well as experience with fisheries training and education. The Training Coordinator must have excellent knowledge of the curricula of U.S. universities, their orientation and capabilities of providing special assistance to foreign students, diploma-level and short-course training appropriate for Omani students. He must also be familiar with and capable of following A.I.D.'s training regulations as contained in A.I.D. Handbook 10. The Training Coordinator will prepare and implement a comprehensive training plan to satisfy training needs identified earlier. He will be stationed in Muscat.

b. Scientific staffing for MSFC

The contractor will provide the services of an Advisor for Research Administration who has extensive experience in research administration, research laboratory operation, financing of research, fisheries research and governmental financing and management of research laboratories. The Advisor for Research Administration will serve as advisor to the Director of the MSFC participating in the operation of the center and will work with the Director in planning procedural, organizational and staffing changes to facilitate operation of the Center. He will also serve as Assistant Chief of Party coordinating the project involvement in DGF and MSFC and supporting the Chief of Party in management of the research and technical assistance teams. He will be stationed in Muscat.

A team of six Senior Research Scientists will be provided by the contractor to conduct task-oriented research at the MSFC and to train counterpart research and research support staff. The researchers should have Ph.D.s in fisheries science and at least 10 years of broad research experience including stock assessment. Experience in the stock assessment of tunas, multi-species demersal stocks, small pelagics or large pelagics is desirable. Researchers will conduct specific management-oriented research on Oman's marine stocks and will formulate increasingly specific management recommendations based on this research. The Senior Research Scientists will be stationed in Muscat.

The contractor will provide consulting services in response to requests from the Director of the MSFC to address specific short-term research needs, special studies, mathematical, analytical, taxonomic, oceanographic or other technical research needs in support of MSFC programs. Special research problems may be addressed through collaborative research involving short-term consultations by collaborating scientists from other institutions.

c. Technical staffing for DGF

A Chief of Party will be provided who serves as leader of the total research and advisory team. He will supervise the work of the team members to serve at the wishes of DGF officials when appropriate. He will serve as direct counterpart to the Director General of Fisheries and will interface directly with the Minister of Agriculture and Fisheries and with other ministers when appropriate. A major responsibility will be the coordination of project inputs with Government activities to accomplish project goals and objectives. He will be responsive to the OAJC project manager in carrying out the work plans and fulfilling contractual requirements. He will work with Government officials and with the private sector of the fishing industry to improve Government policies and services. The Chief of Party should be a senior administrator with experience in fisheries development, research and institution

building. He will be stationed in Muscat.

A Senior Statistician and a Statistician will be provided who have strong backgrounds in fisheries statistical systems, their organization and operation in computer compilation, analysis and publication of data. They will work within the DGF to build, strengthen and streamline the statistics section and to train counterpart staff. The Senior Statistician will be stationed in Muscat and the Statistician in Salalah.

A Senior Extension Expert and two Extension Experts will be provided who have broad experience in the design and management of fisheries extension systems in developing countries. Their role will be to assist with the organization and mobilization of an effective, well-staffed extension organization in Oman. They will work within the extension section training counterpart workers and extension workers, assist with the preparation of training materials, photos, drawings, video presentations and other training aids, and help plan and organize presentations to industry workers. The Senior Extension Expert will be stationed in Salalah and one in the Musandam.

A Master Fisherman and a Vessel Captain will be provided who are well-qualified and who have developing country experience. Their role will be to train Omani master fishermen and vessel captains and to train field extension agents with new gear use and vessel operation. These experts will not have a permanent duty station.

The contractor will provide a Vocational Training expert for a period of three years who has extensive experience in vocational training and in fisheries extension training. A specialty in a fisheries selected field (e.g. gear technology, food technology, navigation or seamanship) is desirable. The Vocational Training expert will work with a selected vocational school (or schools) to develop and establish vocational programs related to the needs of the fishing industry. He will teach courses in the vocational school as part of his duties. He will be stationed in Muscat but may be reassigned as necessary.

The contractor will provide an Economist/Policy Advisor who has a Ph.D. and broad developing country experience in fisheries economics and in national fisheries policies as they relate to economics of common property, open access resource utilization. He will conduct economic analyses and feasibility studies. He will interact with the Director General of Fisheries and the private sector on policy matters and prepare policy advice with economic justification for the DGF. He will be stationed in Muscat.

A Fish Quality Standards Expert will be provided who has a solid background of experience and training in

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the quality standards of developed countries and in systems for ensuring compliance with those standards. The Expert will work within the DGB to establish food quality standards for fish products and a system of monitoring and enforcement of these standards. He will also work with the private sector in introducing methods needed to comply with new standards. He will be stationed in Muscat.

Various consultants will be provided at the request of the Director General to conduct special short-term studies or analyses regarding the fishing industry or to provide particular expertise needed but not available within the advisory team. Examples of potential high priority studies include feasibility studies of fresh fish delivery to European and/or Arabian Gulf markets, study of potential impact of tuna purse seining on traditional fishermen, feasibility study of introducing special handling procedures for yellowfin, bigeye or other tunas to meet demands of Japanese fresh fish markets, economic analyses of certain production aspects of a fish oil/meal industry in Oman, and marketing feasibility/pricing studies of specialty products such as silver roughy, frozen sardines, seaweeds, billfish, or frozen fillets of various trawl-caught species, and special studies related to port development.

d. Project support personnel

Local hire personnel will be provided who have appropriate skills to satisfy requirements of positions as follows: two secretaries, one translator and one administrator/accountant. These people will work in Muscat under the supervision of the Chief of Party.

e. Project backstopping

The parent contracting organization will provide project support and backstopping of both a technical and non-technical nature. For the field team of about 22, initially, they will handle logistical, personnel, information and other services as necessary. They will recruit and hire personnel, administer payroll and benefits and provide overall project supervision to ensure compliance with contract requirements. Regular visits to the project site will be required and problem-solving/administrative guidance and support for project personnel will be provided by senior contracting firm personnel.

It is estimated that 24 man-months per year of backstopping and administrative support will be required to satisfy these requirements.

f. Equipment, vehicles, housing and supplies

The contractor will supply a project vehicle for each expert/advisor and full insurance coverage for operation of the vehicle in Oman. He will provide housing for

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the experts/advisors, equipment necessary for the project and supplies when not available from the Government.

3. Implementation plan

The implementing contractor will prepare a comprehensive implementation plan for the life of the project. The plan will describe roles of project personnel and action to be taken in achieving the objectives of the project. It will include separate components for training, research and advisory services and will include a list of equipment to be purchased. The plan will be organized and presented in a form that can be used to monitor progress toward project objectives on a quarterly basis. The implementation plan will be presented to DGE and the OAJC within three months after signing of the implementing contract. The plan will be subject to review, alteration and approval after discussion among interested parties.

A subset of the implementation plan will be an annual work plan that specifies, in greater detail than the implementation plan, the work schedule for the upcoming year. It will be presented to DGE and OAJC three months prior to the beginning of each work year. A new work plan will be prepared each year. The annual work plan will cover training, research and technical assistance, and will identify milestones and activity completion dates for monitoring purposes.

1. Substantial involvement

Substantial involvement of the OAJC in management of the project is anticipated. The OAJC project manager will be the point of contact for this involvement. The involvement can be summarized as follows:

(1) annual work plans will be prepared in consultation with the OAJC project manager and will be approved by OAJC before work is initiated,

(2) revisions in annual work plans will be made in consultation with and with the approval of the OAJC project manager,

(3) foreign travel of project personnel (except annual leave) will be cleared with the OAJC project manager,

(4) the OAJC will review and approve the selection of consultants hired through the project,

(5) the OAJC will participate in the review and selection of project personnel and replacement personnel,

(6) the OAJC will review selection of trainees for foreign training,

(7) OAJC will clear any project revisions arising from recommendations of evaluation teams.

(8) The Chief of Party will advise the OAJC manager, in a timely fashion, of any significant problems, policy discussions, criticisms by ranking Government officials, or potential conflicts regarding the project or project personnel, and

(9) the OAJC project manager will clear quarterly and annual reports in draft before final printing and distribution.

5. Reporting requirements

A quarterly report will be prepared and submitted to OAJC and the DGF within 30 days after the end of each quarter. The quarterly report will be an activities report with a brief account of activities, status of program work elements, and an account of accomplishments and difficulties encountered during the quarter. The quarterly report will be an internal document that is not distributed to the public.

An annual progress report will be prepared and submitted to OAJC and DGF within 90 days after the end of the project fiscal year. The annual report will review progress and accomplishments in relation to the annual work plan. It will include a brief introductory section reviewing the purpose of the project and the rationale for the annual work plan. Also included will be a discussion of plans for the upcoming year. The annual progress report will be a public document prepared for distribution to interested parties in Oman and the U.S.

The contractor will prepare technical reports on research results, analyses, studies and observations when such documentation is deemed useful for DGF or OAJC. Consultants as well as long-time project personnel will be encouraged to prepare these reports. Technical reports will be a mechanism for preservation of interim results and studies that should be preserved for future reference. Scientific publication of research results will be encouraged when results meet scientific standards for publication. Manuscripts prepared for publication in scientific journals should be cleared by OAJC and DGF prior to submission.

Project accounting and accountability will be handled independently of Ministry administrative and accounting procedures. Project budgets and expenditures will be prepared and monitored by the Project Administrator/Accountant, in consultation with the COP. Quarterly expenditure reports will be presented to the OAJC and the Ministry by the Contractor.

B. Solicitation/RFP

C. Review and Selection Process

D. Conditions for Implementation

1. General roles and responsibilities
2. Operational guidelines
3. Necessary conditions

The following conditions are necessary for the initiation of a new, viable project that will meet expectations of the DGF and OAJC. Action should be forthcoming to demonstrate these steps have been taken.

1) Tangible evidence that the Government is increasing its support for the fisheries sector. This evidence would include increased support for DGF, increased staffing for DGF, and action to ensure that most capable leaders and youth are attracted to the fisheries sector, increased flexibility for field work, increased vehicles, equipment and supplies, and increased support for in-country training (SQL, vocational schools).

2) Hiring of fisheries faculty for all six vacant positions at SQL at the earliest possible date.

3) Demonstrations by DGF that it is ready to fully support a fisheries extension program by:

- at least doubling the number of field extension agents to a total of eight, and implementation of plans to expand this number further,

- provision of working vehicles at all times to extension agents.

- introducing necessary flexibility in hours of work and hours of vehicle use to permit proper functioning of the program,

- actively supporting the extension program with funds for extension materials, mobile units, new gear and necessary equipment,

- identifying trainees, as planned earlier, who will work with the Vessel Captain and Master Fishermen to learn vessel operation and fishing skills for subsequent demonstration to fishermen (10 trainees initially).

4) Full staffing of the statistics program with at least six responsible port agents who will carry out duties as assigned, and support for the statistics program in terms of vehicles and operational flexibility.

5) Demonstration that licenses will be granted to new larger vessels in the private sector.

6) Demonstration that the Government will accept its responsibility to enforce fishing regulations for foreign and domestic fishermen.

7) Activation of the Council for Living Marine Resources Management with private sector participation as called for in the Sultanlic Decree.

E. Monitoring and Evaluation

1. Objectives, targets and indicators of progress

Each of the project objectives noted in section IV.A. can be broken down into multiple targets and targets can be restated as indicators or progress or "bench marks." In the following table these relationships are demonstrated. The indicators of progress are nearly all verifiable, although for some subjective determinations will be required where baseline data are not available.

The project manager will monitor progress continuously and will have access to quarterly activity reports, annual progress reports, and technical reports as well as regular interaction with the Chief of Party. Annual work plans will be prepared on the basis of progress made on the previous year's plan and this process will be another means for monitoring.

Periodic internal project reviews will be conducted by the OAJC.

Sources of hard data will be fisheries statistics on catch, numbers and types of vessels used and species taken, customs reports on quantities and species exported, license information from DGF, data on numbers of graduates, trainees and sources of training, records of participation in extension programs, documentation of recommendations to DGF and documents produced by DGF (e.g. on statistics).

2. Evaluation schedule

External evaluations will be conducted in project years 3, 6, and 8. These will be conducted such that major decisions can be incorporated in the annual review of the

contractor's implementation and training plans and they will provide sector impact analyses for Action Plans. Each evaluation will include an in-depth review of improved institutional capacity in the fisheries sector. The evaluation in project year 6 will also provide information for the Phase III project design. A final post project impact evaluation will be conducted in project year 8.

4. End of project status

By the end of this project in 1997 significant changes will be apparent from four organizational viewpoints. These viewpoints are the industry, the DGF, the MSFC and the educational system of Oman.

From the industry viewpoint landings will have more than doubled and exports will have increased nearly three-fold. The quality of exported fishery products will have been substantially improved netting value increases per unit of volume. Traditional fishermen will have improved their gear and fishing practices as well as fish handling procedures and incomes will have improved as a result. At least two new harbors will be available to fishermen and better access to fish markets will be provided by additional private cold stores. Government policies regarding the private sector will be improved and new fishing businesses will be operating with modern vessels and gear outside the traditional fishermen's exclusive zone. The OFC will be the largest single contributor of marine fish for export and for local consumption and will be operated primarily with foreign-owned vessels and foreign crews.

The DGF will be serving the industry with operational statistics and extension programs and will be utilizing research results from the MSFC and data from its own statistical system to establish new fishing regulations. DGF will be assisting the Omani Coast Guard in the enforcement of fishing regulations. The overall capability of the DGF will be enhanced by the presence of numbers of trained and educated staff members better qualified to execute their duties and to advise the Director General regarding conservation and management of marine resources.

The MSFC will be a working arm of the DGF providing a steady flow of research results in response to DGF needs. Initial stock assessment estimates will have been provided on all major stocks and research will be directed toward refinement of estimates and on improving biological knowledge on a species by species basis to improve management recommendations. Analytical procedures will be in place for ongoing interpretation of statistics collected by foreign vessel observers and statistical agents of DGF for stock assessment purposes.

Components of the educational system of Oman relating to fisheries, particularly SQU, vocational schools and

the OOB extension training system, will be partially staffed with Omani professors, teachers and instructors and will be shifting rapidly toward Omanization of their staffs. Enrollment of college and vocational school students in fisheries-related curricula will be greatly increased.

Ideas for attracting professors to SQB:

1) Total benefits package should be as large as possible. Most foreign professors who visit for short-term or long-term assignments will entail numerous expenses in moving and at their permanent place of residence that are not obvious to administrators here.

2) Unfortunately, the University already has a reputation of promising a set of benefits, then "adjusting" those benefits once the professor is settled in Oman. A high level of professional integrity will be required on the part of administration.

3) Research opportunities in Oman can be a special drawing card for professors, especially those who might be available on sabbatical. This would mean the ready availability of vessel time with a variety of gear ready for use.

4) Generous leave allowances can be a special attraction as many professors would like to have time to travel or pursue research opportunities in a variety of locations.

5) Stronger linkages with MSFC, CTC and research centers in the region would be attractive. Professors appear isolated at present.

6) Total staffing must be maintained at adequate levels to create a positive, fulfilling work environment rather than a discouraging, "impossible" one.