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SULTANATE OF OMAN
FISHERIES DEVELOPMENT MASTER PLAN

The Directorate General of Fisheries
Ministry of Agriculture and Fisheries
Sultanate of Oman

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EXECUTIVE SUMMARY

This Fisheries Development Master Plan covers the time span up to the year 2010, and its major components have been developed within five-year intervals.

1. STRATEGY

The overall strategy adopted in this document aims at a full rational exploitation of fishery resources, on a sustainable basis, within the EEZ of Oman. The objectives of the plan, in line with the national development objective of diversification of the economy, are:

- improvement in incomes, living standards, and status of traditional fishermen;
- increased nutritional standards, at lower cost as the industry becomes more efficient;
- import substitution;
- growth in supply and service industries, employment therein and in value added processing of fish product
- further employment prospects for citizens;
- economic investment projects for the use of national sources of capital.

These objectives apply both to the traditional sector and to the industrial fisheries.

The role of the Government is seen as one of stimulating the development through proper management of the resources and creation of favourable conditions for development. The latter includes the just and timely allocation of fishing quotas, provision of training, extension services, and credit as well as infrastructure facilities with emphasis on fishing harbours, landing facilities and support services. Strengthening of Government institutions, particularly the Directorate General of Fisheries, is a prerequisite for the implementation of the strategy. This indicative plan places particular emphasis on elimination of constraints to fisheries development identified in the document.

The private commercial sector is expected to invest in the fisheries, both in vessels and fishing equipment, and in shoreside infrastructure, notably processing facilities, cold storage complexes (ice, freezing, storage), transportation, and ancillary services. The Government's role in this connection will be to assist the private sector by allocating catch quotas -- within the overall resources management framework (TAC) -- and facilitating the establishment of companies in accordance with the overall national policy in this respect.

The traditional fishery will retain its role as the primary producer of fish for the domestic and export markets. The resources currently exploited by the traditional fishery will be reserved for this sector, with further expansion made possible by larger boats. The fishery will require considerable upgrading and modernization, as will the skills of the fishermen and their social status. Infrastructure, particularly with regard to landing facilities, will have to be provided along with the introduction of more modern boats to be used by the traditional fishermen. As investment decisions, notably acquisition of new boats, will remain the responsibility of

the traditional fishermen, the Government will create an appropriate business climate and provide assistance to encourage this development process. Production targets, therefore, have to be seen as a desirable production level to be attained by the traditional sector. Traditional fishermen can become more economically efficient and growth oriented with training and financial support. The skills of their seamanship and knowledge, the commitment to a seagoing culture and living on the oceans edge, place the traditional fishermen at the centre of the considerable fisheries potential of the country.

2. FISHERY RESOURCES

The current stock information is adequate for the first stages of development, but not for fine tuning the fishery. The probable safe yields, based on present knowledge, are taken as a foundation for the development of the fishery. The possible yields can be verified as the fishery develops and research programmes continue. The potential yields may have to be amended as new knowledge of the status of the resources becomes available.

The greatest potential for development is represented by the resources of small pelagic fishes. This group is composed of a variety of species, including sardines, scads, and anchovies. Their utilization and marketing may pose problems. Out of the total available potential of 284,000 mt the small pelagic species constitute as much as 232,500 mt. Most of the potential, viz. 192,500 mt is to be exploited by the Industrial sector.

Demersal resources, as well as tunas, offer a relatively limited scope for development. Out of the total available 29,000 mt of demersal species, 10,000 mt will be required to satisfy the projected needs of the traditional sector. As far as tunas are concerned, out of the additional available potential of 13,500 mt the traditional sector will need two-thirds, or 9,000 mt. the remainder is projected for exploitation by the Industrial sector.

The traditional sector has been given priority as far as exploitation of kingfish and crayfish are concerned, as well as other resources within the inshore areas. It should be noted, that due to resources limitations no increase in production of kingfish or lobster is projected.

Large stocks of mesopelagic fishes (1 million mt?) are known to exist in the Gulf of Oman, but the technology does not exist for economic harvesting and processing. In addition, large stocks of deepsea demersals and squid are suspected, but not documented. None of these resources have been addressed in this plan.

The incremental amount of fish to be caught by the traditional sector is earmarked as 68,000 mt. This constitutes an increase of 64% over the 1987 catch; the average annual rate of growth is 2.3%. The projected growth rate has been arrived at taking into consideration (i) the limitations on availability of manpower in this sector and, (ii) the fact that the sector will have to undergo considerable modernization.

3. FISHING VESSELS

In the traditional sector existing types of fishing boats will be replaced by more modern ones, especially since the existing fleet is aging and requires renewal. The determination of fishing areas reserved for the traditional fishermen will be made on the basis of a

resources management plan and established resources allocation principles.

The projections of vessels for the traditional fishery have been made in consideration of (a) the aging of the existing boats and the relatively low efficiency of some of the types presently in operation, and (b) the need to modernize the sector in order to achieve the objective of improving the income of fishermen, increasing their social status, and increasing production of fish for the domestic market.

The total number of boats will decrease from 7,424 in 1987 to 5,697 in 2010. The main reduction stems from the projected total elimination of shasha's and reduction in the number of skiffs. It is envisaged that a total of 1,300 fishing workboats 9 metres long. Both types are presently not known in Oman, and their introduction is considered to bring in a new quality of equipment to the industry. Their productivity, and therefore economics, are better than those of the existing types of vessels.

The introduction of the new vessels for the traditional sector is contingent upon:

- (i) provision of adequate, specialized fishing harbours;
- (ii) demonstration of their viability to the fishermen, through a well functioning extension service;
- (iii) continuation of financial assistance to fishermen who want to acquire the new boats, through the Fishermen Encouragement Fund;
- (iv) provision of training to the traditional fishermen, but particularly to young persons wishing to engage in this occupation. The provision of training would also be aimed at the objective of retaining the population in the present rural areas, and upgrading the social status of the fishermen.

While the selection of detailed types of boats and their introduction will have to be preceded by a detailed economic feasibility analysis, the projections show that the introduction of new vessels will cost some R.O. 64.3 million. The annual value of the increased catch of 68,000 mt is estimated to be R.O. 32.2 million, and the present value index over the economically useful life of the vessels is calculated to be 1.99, at a discount rate of 10%.

It is projected that the industrial fishery in order to exploit the groups of resources available by the year 2010, will need a total of 56 new vessels, over and above those operating at present. The economic projections, on which the introduction of new industrial vessels is based, show a very high potential for profitability of investment, which in the case of the fleet alone (without infrastructure) shows an extremely high net present value index of almost 6.

It is anticipated that a full exploitation of the small pelagic resource in the Arabian Sea, which constitute the bulk of the potential for growth of total catch, will have to take place gradually, over a period of 15 - 20 years. This development is contingent on two factors:

- (i) availability of harbours to accommodate the fleet in the southern part of the Sultanate;

(ii) development of markets for small pelagic species or their economic utilization for fishmeal.
A full exploitation of demersal resources, tuna, as well as small pelagics in the gulf of Oman has been projected to commence between 1990 and 1995.

4. INFRASTRUCTURE

Protected harbours along the coast of Oman are a prerequisite for the development of the country's fishing industry. Lack of specialized fishing harbours has been identified as the major constraint to fisheries development. The important goals of increased fishery production and continued, harmonious fishery development cannot be reached without substantial investment in harbour infrastructure. Such an investment is the responsibility of Government, within its programme of stimulating fisheries development.

The projections made in the document are of a conceptual nature, for preliminary allocation of financial resources to cover the harbour needs. Engineering and social analyses will have to verify the projections, and will constitute a basis for actual investment decisions.

The plan envisages the construction of (a) four harbours capable of accommodating the entire projected industrial fleet and a part of the traditional fisheries fleet, and (b) construction of five smaller harbours capable of accommodating the remaining numbers of smaller, traditional, boats.

The total investment in fishing harbours is estimated to be R.O. 50 million over the period of 20 years. The construction of harbours should start during the 1991-1996 five year plan period, to provide the indispensable infrastructure for projected catch increases, and the fleet to produce them. For the purpose of this plan two-thirds of the investment (R.O. 30 million) cost has been included in the 1991-1996 period, and the remainder during the subsequent five year plan.

5. MARKETING AND UTILIZATION OF FISH

The present national demand for fish is considered to be fairly well met by present landings. According to FAO estimates the consumption per capita in 1979/81 was around 20kg/year, and it is most likely higher today as a result of increased landings, and a better distribution system. A modest increase in national per capita fish consumption, of some 20% over the plan period, is also anticipated as a result of the population becoming more diet conscious and a fish consumption promotion programme. The bulk of the incremental catch will, therefore, have to be exported. The key to exporting fish is its species and quality.

The main problem anticipated at the planning stage is the utilization of small pelagic species, primarily sardine. As small pelagic species account for the bulk of the incremental catch: 192,500 mt or 88% of the total catch increase, the problem of their utilization and marketing is of paramount importance. These are species of a relatively low market value, and there are only few international markets capable of absorbing the volume discussed. Development of a processing industry (canning, salting, drying) will

have to be left to the private sector.

Basic shoreside facilities like processing plants, cold storage complexes, transport etc. should be provided by the private sector. The latter may seek loans and Government support in order to invest in such facilities. The total value of private investment in shoreside facilities is estimated at R.O. 28 million between 1990 and 2000.

6. STRENGTHENING OF INSTITUTIONS

A continually updated understanding of resource potential is essential to careful management of a fishery. A very close cooperation and coordination between the DGF's administrative units, and its research arm - the MSFC - are therefore indispensable to achieve the resources management objectives.

Training for both the administrative staff of the DGF and for scientists of the MSFC is essential to allow the institutions to perform their roles.

A strong, well organized and well staffed Extension Service must be further developed in the Directorate General of Fisheries, with the task of serving all traditional fishermen. The extension service should be equipped with two types of vessels recommended for introduction to the traditional fishery, which would travel from one major fishing centre to another to demonstrate operations of the vessels.

In view of the complexity and urgency of the extension service tasks it is recommended that strengthening of the existing extension unit of the DGF start immediately, so that by the year 1991 - the first year of this long term plan, the extension service is in place and fully operational. Training of extension workers is a long term endeavour and this emphasizes the urgency of actions.

7. TRAINING NEEDS

A well planned and coordinated development of any economic sector, and fisheries is no exception, depends more on the availability of properly trained and skilled manpower than on any other input to be provided.

Training is required at all levels:

- fisheries administrators (in a number of specialized fields) for the DGF;
- fisheries scientists for the MSFC;
- fisheries extension workers;
- fishermen, and especially officers for fishing vessels, if the industrial fishing operations are to be conducted by nationals;
- fishermen for the traditional fishery.

Considering the needs of the industry, identified at this stage in general terms, it is recommended that a fisheries training school be established in Oman, and its creation has been scheduled for the period 1991-1995. Preparatory work, however, should start in 1989.

8. ECONOMICS

workboats for the extension program. *upst <*

- details*
8. Detailed planning, design, and tendering for construction of a fisheries training institute, including a training vessel. cost = RO 50,000.
 9. Review and revision of Government procedures and regulations with regard to fishing boat licensing and enforcement of fisheries laws.

1991 - 1996

1. Continuation of resource assessment activities, including at least 12 months of resource surveys using a chartered vessel. Cost = RO 1,000,000.
2. Continuation of training programs for Government fisheries staff. Cost = RO 250,000 + donor funding.
3. Expansion of Extension Services vessel demonstration program, including acquisition of 10 meter and 15-18 meter demonstration vessels. Cost = RO 350,000.
4. Investment by traditional fishermen in 900 up-graded boats. Cost to fishermen = RO 38,000,000 (to be partially offset by Government assistance.)
5. Investment by private sector in 21 industrial fishing vessels. Cost = RO 4,400,000 (financing by Agriculture and Fisheries Bank).
6. Investment by private sector in processing plants and ancillary services. Cost = RO 13,960,000.
7. Detailed design and construction of four major harbours at Capital, Sur, Duqm, and Raysut, and five smaller harbours at Batinah, Quriyat, Al Ashkara, Hasik, and Sudah. Phase I cost = RO 25,000,000.
8. Construction and operations of Fisheries Training Institute. Cost = RO 3,000,000 for 1993 - 1995 operations.
9. Procurement of training vessel for Fisheries Training Institute. Cost = RO 400,000.
10. Implementation of fisheries education program in schools and public media. Cost RO 1,000,000.

1996 - 2000

1. Continuation of resource assessments. Information from commercial fleet.

2. Continuation of Extension Services demonstration and training programs.
3. Investment by traditional fishermen in 382 up-graded boats. Cost to fisherman = RO 11,700,000 (to be partially off-set by Government assistance).
4. Investment by private sector in 13 industrial fishing vessels. Cost = RO 3,400,000 (financing by Agriculture and Fisheries Bank).
5. Investment by private sector in processing plants and ancillary services. Cost = RO 5,100,000.
6. Phase II Harbour development at same nine sites. Cost = RO 20,000,000.
7. Design and construction of drydock and marine railway at Capital or Sur. Cost = RO 7,000,000.
8. Implementation of consumer education program promotion seafood products, domestic and export. Cost = RO 300,000.
9. Continuation of Fisheries Training Institute. Cost of operations = RO 5,000,000.

2001 - 2010

1. Continuation of resource assessments. Information from commercial fleet.
2. Continuation of Extension Services demonstration and training programs.
3. Investment by traditional fishermen in 565 up-graded boats. Cost to fishermen = RO 14,600,000 (to be partially offset by Government assistance).
4. Investment by private sector in 22 industrial fishing vessels. Cost = RO 8,800,000 (financing by Agriculture and Fisheries Bank).
5. Design and construction of second smaller drydock at unspecified location. Cost = RO 2,000,000.
6. Continuation of Fisheries Training Institute. Operating Costs = RO 10,000,000 for ten years.

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0.0 INTRODUCTION

Fisheries have traditionally played a significant role in the social and economic development of the Sultanate of Oman. They have been an important source of highly nutritious food and the primary means of livelihood for thousands of fishermen and their dependents in virtually all communities along Oman's 1700 kilometer coastline. Although the economic role of fisheries has been overshadowed by the petroleum industry in the last fifteen years, the fisheries sector has made a substantial contribution to the national economy. It has generated economic activity, earned foreign exchange, and assisted the Government in realizing its policy objectives of economic diversification and rural development. This has become especially important since the recent downturn in oil prices.

The importance of the fisheries sector has been recognized by Government leaders in Oman for a number of years. As early as 1975, His Majesty Sultan Qaboos bin Said set forth policies giving high priority to the fisheries sector. These policies were put into effect with the implementation of the First Five-Year Fisheries Development Plan from 1976 to 1980. Further Royal Decrees governing fishing and the protection of living aquatic resources have been issued since then, and two additional Five-Year Development Plans have been partially implemented. These policy declarations and development plans have been executed by the Ministry of Agriculture & Fisheries, which has also promulgated regulations to manage the resource and the industry.

The Sultanate has embarked on an ambitious program in the fisheries sector in the course of implementing the three Five-Year Plans. The Government has undertaken numerous fisheries projects through its Directorate General of Fisheries, expanded the number of development objectives, and increased its financial commitment to the fisheries sector. This has had a positive and immediate effect on fisheries development; however, a long-term strategy has not yet emerged. While the Government and the private sector recognize the great potential of fisheries, neither has a clear image of the many constraints to be overcome and the steps to be taken to realize this potential within a realistic time frame. This document attempts to address that need. The specific purpose of this Fisheries Development Master Plan is to assist the Ministry of Agriculture & Fisheries in policy and program planning through the year 2010 i.e. through the next four 5 year development plans.

Preparation of the Master Plan has been based on a thorough examination of the development needs and potential of the fisheries sector in Oman. Careful attention has been given to balancing fishing effort with resource potential and market limitations, to matching harbor development with future fleet characteristics, and to encouraging handling, processing, and market facilities appropriate to domestic and export market requirements. Fisheries management and enforcement have been addressed in the context of developing Government expertise to determine allowable catches, and to regulate and monitor the fisheries sector.

This indicative long-term fisheries development plan, by definition, presents in broad terms the development potential and needs, as well as recommended actions for consideration and approval by the Government. It contains a strategic vision of the Oman fisheries over the time span of some 20 years, and estimated investment both by the public and private sectors needed to achieve the set targets. Development of the fisheries sector will require a strong fisheries administration, with a full capacity to manage the resources and implement Government's decisions aimed at promoting private sector's participation. Development of human resources, both for the Government service and for the industry as a whole has to be seen as a major responsibility of the Government. Those two elements have therefore been given the emphasis they deserve. Finally, a preliminary economic analysis of costs and benefits of this indicative plan complements the report.

It is anticipated that this document will become a basis for five-year plans in fisheries. Detailed feasibility studies of individual projects, components of such plans, will then be carried out. As time goes on, the estimates of resources potential will be updated and the five-year plans, or indeed annual plans and catch and effort allocations, will have to be revised accordingly. This indicative plan should thus be subject to periodic modifications "on a rolling" basis, and should not be considered an absolute, dogmatic, basis for further actions. The nature of fisheries resources, their dependence on elements beyond human control (compounded by human exploitation), require continuous monitoring, management and corrective measures, especially in the allocation of fishing rights to exploit them.

1.0 GOALS, OBJECTIVES, AND POLICIES

The goals for fisheries development in the Sultanate of Oman have been established by the Sultan, His Majesty Qaboos bin Said. The four goals are:

- (1) diversify the national economy;
- (2) promote rural development and halt urban migration;
- (3) improve nutrition among the Omani people; and
- (4) ensure effective marine resource management.

These goals form the basis for long-term planning in the fisheries sector. They are by definition broad policy and they determine the objectives of fisheries development. The specific objectives associated with each goal are presented below.

Economic diversification is one of the primary goals of national development in Oman. Its importance stems from the recognition that oil is a non-renewable resource that will not last indefinitely, and is subject to erratic price fluctuations. In view of this situation, the fisheries sector has added significance because of its capacity to make an increased contribution to the national economy.

The goal can be achieved by:

- * an increased level of rational exploitation of the fishery resources; and
- * maximizing the value of production through improved fish handling and processing contributing to increased value-added, and effective marketing both domestic and export.

The key to rational exploitation of the fishery resources lies in their proper management. An increased level of exploitation will require investment, both public and private, in infrastructure and means of production. Development of human resources, both skilled operatives and managers, as well as fisheries scientists and administrators, has to constitute a crucial component of any programmes aimed at attaining this goal.

The second goal 'to promote rural development and halt urban migration' is equally important in Oman's overall development program. It is a goal to which fisheries can make a substantial contribution because of the investment and employment opportunities open to rural communities throughout the country. Meeting the objectives inherent in this goal can be accomplished by:

- * expanding infrastructure (harbors, plants, roads) required for traditional fish activities;
- * providing incentives for the upgrading/modernization

- of fishing craft and gear and demonstrating their viability;
- raising the social status of fisheries occupations;
- providing expanded marketing outlets, including export.

The modernization of equipment would make the work of fishermen easier, less arduous, and at the same time it should provide them with increased fishing capacities. Improved marketing should result in easier disposition of catch, which together with improved quality of landings would result in higher incomes. The aforementioned, together with a public awareness campaign should result in a better appreciation of the fishermen's role in the country, their higher social status, and attract new entrants into the industry.

The role of the fisheries sector in the third goal of improved nutrition among the Omani people is readily apparent. Fish is a high-quality, low-fat protein food. It is frequently the cheapest and most abundant animal protein food available in coastal as well as interior areas of the country. Efforts can be taken to improve nutrition among Omanis by:

- ensuring the availability of quality, reasonably-priced fishery products throughout the country; and
- increasing demand for fishery products by developing consumer awareness of the beneficial effects of eating fish.

The fourth goal of marine resource management has been inferred from national policy statements calling for sustained development, and is applied specifically to the fisheries sector. Without an effective management regime, a fish species or fishing area can be overfished to the extent that the long-term renewability of the resource is threatened. To safeguard against this type of overexploitation, effective management should be introduced and implemented by:

- developing the Government's capacity to manage the national fisheries, and regulate exploitation of the resources and close collaboration and cooperation between Government, the fishing industry and the traditional fishermen.

1.1 STATEMENT OF POLICIES

This long-term indicative fisheries development plan is based on the general goals expressed by His Majesty The Sultan, and the objectives discussed above. It draws on policy options contained in "Fisheries Development in Oman - A review of policy options and proposals for development" prepared for the Government by the Marine Resources Assessment Group Limited (Imperial College of Science and Technology, University of London) in January 1988. The general policy options have been translated into more specific policy guidelines, which will serve as a framework for recommended programs. These policies are as follows:

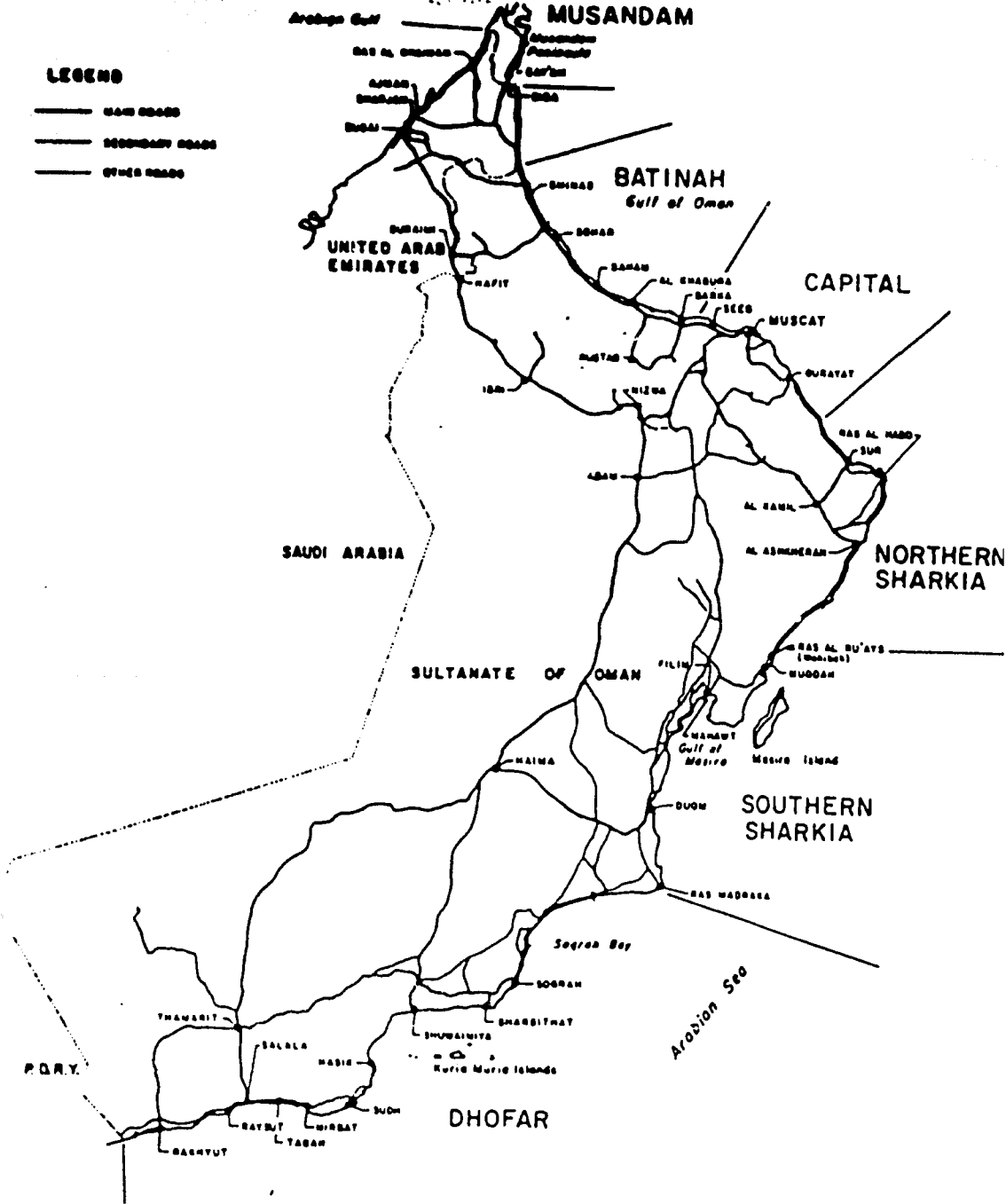
It shall be the policy of the Government that the fisheries resources of the Sultanate shall be exploited for the general benefit of the people of Oman. In pursuing the rational development of marine resources, the following guidelines shall be followed:

1. Exploitation of resources shall not exceed the average maximum yield which can be sustained on a long-term basis 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. The skills and commitment of the traditional fishing communities shall be expanded and encouraged through training programmes and through introduction of modern and appropriate fishing methods, fishing vessels and fishing gear. Traditional fishermen shall be supported in their long-term growth objectives towards the development of a diverse and modern fishing fleet capable of exploiting the full range of fishery resources within the Exclusive Economic Zone, and, beyond, into International waters. Traditional fishermen and their communities, companies and organisations shall be given preferential access to areas and species over which traditional territorial use rights have been established. This shall be undertaken through a system of Traditional Fishermen's Reserved Areas. Traditional fishermen that become commercialised shall also be given access rights to those areas and species that have been set aside for commercial companies, under similar terms and conditions and when they have the capability to do so.
4. 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 & Fisheries.
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 & Fisheries. A complementary, yet competitive, business environment within the fisheries sector is to be encouraged.
6. Although it is the long-term goal that all fishing activities will be owned and operated by Omani Nationals, in the short term commercial fishery companies shall be permitted to enter into relationships with foreign fishery companies, as long as these ventures adhere to the terms and conditions of the Government with regard to:

.the chartering of foreign vessels;

- .joint ventures or other forms of commercial arrangements in fishing, processing, marketing and fishing vessel and fishing gear manufacture;
 - .the temporary use of foreign skilled and unskilled crew, processing, management and support industry personnel, and the training of nationals to replace them at all levels;
 - .the requirements of the government in the sustainable management and development of the national fishery resources.
7. 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.
 8. The private sector shall be responsible for the further development of cold stores, processing plants, and such other auxiliary facilities as are required to foster growth of the fisheries sector.
 9. The Government shall development basic infrastructure. Such infrastructure shall include:
 - .harbours, wharves, jetties, landing sites;
 - .roads and communications;
 - .industrial and commercial sites (including power, water, and sewage treatment) for fish processing, fish marketing and fishing vessel, gear and equipment manufacture; and
 - .infrastructure related to housing and the development of centres of economic activity based on fisheries;
 10. The Government shall maintain a system of collaboration within all Ministries and through the private sector, including traditional fishermen and commercial fishery companies, to ensure that all the complex and diverse aspects of the management and development of the fisheries sector are integrated to the benefit of the nation.
 11. The Government, in collaboration with the private fisheries sector, shall provide training programmes for Omani Nationals to ensure adequate skilled manpower in all segments of the industry.
 12. The Government shall maintain a system of legal regulations and administrative procedures that are responsive to changes in the fisheries sector as development proceeds, including, among other things:
 - .ongoing research into the status of fisheries resources;

- .surveillance, monitoring and enforcement of the law, regulations and administrative procedures;
 - .the control of the amount of fishing effort on the fish stocks by all fishermen in order to ensure sustainable harvesting into the future;
 - .measures to ensure maximum economic benefit from harvested fish stocks, including quality and export control; and
13. The Government, through its Bank for Agriculture and Fisheries, shall provide assistance to the fisheries sector by granting loans, administering grants and subsidies, participating in the capital of enterprises, providing technical assistance and carrying out other banking activities within the scope of the principal objectives of the bank.




	<p>SITE LOCATIONS FOR THE STATISTICAL SAMPLING PROGRAM</p>
	<p>RDA INTERNATIONAL, INC. 801 MOREY DRIVE PLACERVILLE, CA. 95667</p> <p style="text-align: right;">RDA-10/86</p>

Figure 1. Map of The Sultanate of Oman, indicating the five statistical sampling regions and the Musandam, and some of the key sampling areas within each region.

2.0 FISHERIES SECTOR OVERVIEW

Collection of comprehensive data on the fisheries sector in Oman was first initiated in July 1984. Since that time the Directorate General of Fisheries has been engaged in obtaining baseline data on the number of fishermen and fishing vessels in Oman; the volume, value and composition of fish catches; the location of infrastructure facilities; and the size and character of major fish markets. This section reviews these data on a regional basis, looks at the resource potential, and examines the operations of the off-shore trawlers.

The six regions designated for fisheries statistics are, from north to south, the Musandam, Batinah, Capital, Northern Sharkia, Southern Sharkia, and Dhofar (Figure 1). The Musandam Peninsula forms the southern part of the Strait of Hormuz at the entrance of the Arabian Gulf. It is geographically distinct from the rest of Oman, separated by the United Arab Emirates. The Batinah region extends 250 kilometers (km) along the coast from the United Arab Emirates to a point between Barka and Seeb. The Capital continues 190 km down the coast to just south of Tiwi; the Northern Sharkia 290 km to just north of Ras Ruays; and the Southern Sharkia 360 km to just south of Ras Madraka, plus the 130 km of coastline around Masira and Mahawt Islands. The Dhofar includes the Kuria Muria Islands and 680 kilometers of coastline from Ras Madraka to the border with the People's Democratic Republic of Yemen.

The statistical division of regions (six regions) does not correspond precisely to the two broad areas for which resources abundance estimates are available. The latter is based on a much wider geographical area, and values shown for the Gulf of Oman and for the Arabian Sea are approximate only. From the point of view of resources allocation by region a great degree of caution as well as flexibility is required, especially in view of the migratory nature of some of the resources.

2.1 RESOURCES

Estimates of fish biomass in the waters off Oman vary tremendously. The variation is due to a lack of comprehensive stock assessment information and to uncertainty about resources fluctuations between seasons and from year to year. It should be pointed out that the figures showing potential yield (Table 1) are the best available estimates. As more stock information becomes available, the estimates may be revised upwards or downwards, as the case may be. Research programmes, underway at the Marine Science and Fishery Centre (MSFC), will be able to produce more accurate estimates of the exploitable fish stocks. Stock assessment, however, is a continuing process and it depends both on resources surveys at sea as well as availability of a wide range of data from current fishing operations. The resources survey, due to start in 1989 (of one year duration), supplemented by statistical information and other research, will enable the MSFC to start a regular stock monitoring and assessment programme, indispensable for fisheries management.

Table 1. Available Fisheries Resources in metric tonnes

Groups of species	Potential yield	Actual catch - 1987	Available resources
Small pelagics			
Gulf of Oman	40,000	17,448	42,500
Arabian Sea	200,000	9,004	190,000
Tuna			
Gulf of Oman	20,000	9,084	10,000
Arabian Sea	20,000	16,649	3,500
Kingfish			
Gulf of Oman	3,000	2,841	0
Arabian Sea	13,000	22,627	0
Shark/other pelagic			
Gulf of Oman	4,000	3,338	500
Arabian Sea	10,000	1,643	8,500
Demersals			
Gulf of Oman	10,000	6,659	3,000
Arabian Sea	40,000	14,311	26,000
Lobster			
Gulf of Oman	0	0	0
Arabian Sea	2,000	1,557	0
Total - resources being exploited			
of which: Gulf of Oman	382,000	106,041	284,000
Arabian Sea	97,000	40,170	56,000
	285,000	46,671	228,000
Deepsea demersals			
	?	?	?
Mesopelagics - Gulf of Oman			
	1,000,000	1,000,000	1,000,000
Arabian Sea	?	?	?

Note: The potential yield is based on the best available information which needs updating. When more stock assessment work is done by the MSFC the figures may be revised.

The available resource estimates, all indicate that most of the resources are not yet fully exploited. Estimates of Maximum Sustainable Yield (MSY) -- that level of production that can be sustained over an indefinite period of time -- vary to the same degree that biomass estimates vary. There is, however, some consensus among experts - documented in published reports - suggesting that the sustainable yield for the species currently exploited in the waters off Oman is around 380,000 metric tons (mt) annually (Table 1). The current catches are slightly above 100,000 mt/year. Such global figures provide only a general indication of the potential, and groups of species need to be analyzed separately. The grouping of species, unavoidable in an aggregation of stock assessment findings, conceals important differences between individual species, their economic value, marketability etc.

In terms of volume the most abundant unexploited stocks are those of small pelagic fishes. It is, however, a group which embodies a great number of species, the most important of which are sardines, scads, mackerel, and anchovies. The estimated total potential yield is 60,000 mt in the Gulf of Oman and 200,000 mt in the Arabian Sea. Based on existing information it is estimated that less than half of the potential are sardines, and a large proportion is Arabian Scad, which has a low marketability. This information needs to be verified in the course of stock assessment work. A probable safe incremental yield, based on present knowledge, is thus around 230,000 mt between the Gulf of Oman and Arabian sea (compared to present catch of some 27,000 mt). The economic value of the small pelagics resource, understood as market value of the fish or fish products derived from it, is relatively small due to small unit price (whether ex-vessel or retail).

Shallow-water Demersal species (bottomfish) account for a significant part of the remaining potential. A total of 50,000 mt seems to be available, of which 10,000 mt are in the Gulf of Oman and 40,000 mt in the Arabian Sea. The present reported catch is of the order of 21,000 mt, thus the potential for increase is significant. A probable safe incremental yield based on present knowledge is thus around 30,000 mt between the Gulf of Oman and Arabian Sea, which can be verified as the fishery develops and as research programmes continue.

There is probably no potential for increased production of lobster, shrimp and abalone. Those resources are likely to be exploited at the level of their MSY. Further research will contribute to verification of this opinion.

Tuna resources are loosely estimated to be capable of supporting a potential yield of 40,000 mt. These resources are, however, highly migratory and the estimates would require confirmation. The 1987 Omani catch of all tuna species was reported to have been 26,533 mt, considerably higher than during the previous years. A conservative estimate of additional yield would be approximately 13,000 mt.

The kingfish resources have an estimated potential yield of 16,000 mt, however, the present level of exploitation (25,000 mt in

1987) is already above it. It is prudent not to recommend, at least for the time being, an increased exploitation of this resource and may in fact, be prudent to recommend a decrease.

The resource potential of mesopelagic species, such as lanternfish, is probably in excess of 1,000,000 mt. However, after numerous attempts in other parts of the world, no methods of utilization of this resource have been developed.

Little is known of the stocks of deep-sea demersals, but the high productivity of the Arabian Sea suggests that large stocks may exist in waters deeper than 200 metres. A survey of this potential is definitely warranted as a part of the programme schedules for 1989.

2.2 THE PRESENT STATE OF THE FISHERIES SECTOR.

The fisheries sector of Oman may be divided into the traditional fishery and the more recent industrial fishery. The term "traditional fishery" denotes fishing activities along the whole coastline of Oman pursued by small-scale fishermen, employing a variety of fishing craft and gear, limited in its range of operations and showing a relatively low level of production per boat or fisherman. The industrial fishery is at present pursued by the Korean Overseas Fishing Company operating under special agreements with the Government of Oman and the Oman National Fisheries Company. In addition, Oman Sea Company, operates a single locally-owned trawler. These vessels within a concession area in the Arabian Sea. A new pattern of concession agreements and fishing zones is being introduced in late 1988.

The analysis of the sector is based on statistics as available in October 1988. As comprehensive collection of fisheries statistics was begun only a few years ago, annual variations shown may be due to improvements in the quality of statistical data rather than actual changes in the sector. Furthermore, as the statistics are based on sampling, and not on records of actual landings, there is another potential margin of error inherent in the sampling method. Landings, for example, are estimates based on samples taken at key sites in each statistical region; the number of fishermen is estimated based on the number of vessels and average crew per vessel. Where such uncertainty exists it will be pointed out in the text.

2.2.1 The traditional fishery

2.2.1.a General

The traditional fishery is the mainstay of the sector in Oman. In 1987 it landed 104,055 mt of fish which equals 90% of the total fish catch by tonnage and 92% in value terms (Table 2). The fishery provides full and part-time employment for an estimated 13,500 persons in the primary sector, i.e. fishermen. Its impact on employment in processing, marketing, transportation, services, and related activities (both secondary and tertiary sectors) is considerable, however, at this stage impossible to quantify. The value of

TABLE 2. FISHERIES STATISTICS - SUMMARY FOR 1987

Statistical Region	KINGFISH	TUNA	SMALL PELAGIC	LARGE PELAGIC	SHARK	HAMMOCK	DEMERAL	CRAYFISH	OTHER	TOTAL MT	% BY REGION	VALUE (R.O.mln)	Value/mt R.O.
BATIMOH - MT	1,441	3,457	15,726	1,645	946	360	2,569	2	349	26,515	25.5%	4.38	165.198
% OF TOTAL	5.4%	13.0%	59.3%	6.2%	3.6%	1.4%	9.7%	0.0%	1.4%	100.0%			
APITAL - MT	1,394	6,370	1,722	1,300	487	235	666	0	100	12,274	11.8%	2.82	229.754
% OF TOTAL	11.4%	51.9%	14.0%	10.6%	4.0%	1.9%	5.4%	0.0%	0.8%	100.0%			
SUMBERIA - MT	2,236	9,754	404	1,384	1,868	312	1,431	88	42	22,521	21.6%	7.10	315.261
% OF TOTAL	32.1%	43.3%	1.8%	6.2%	8.3%	1.4%	6.4%	0.4%	0.2%	100.0%			
SUMBERIA - MT	15,239	6,551	0	2,325	3,059	228	1,139	374	309	29,224	28.1%	11.10	379.825
% OF TOTAL	52.1%	22.4%	0.0%	8.0%	10.5%	0.8%	3.9%	1.3%	1.1%	100.0%			
DHOEFAR - MT	24	312	9,480	143	31	98	351	1,893	137	11,669	11.2%	4.24	363.356
% OF TOTAL	0.2%	2.7%	81.2%	1.2%	0.3%	0.8%	3.0%	9.4%	1.2%	100.0%			
MUSANDAM - MT	6	57	0	24	0	0	1,765	0	0	1,852	1.8%	0.38	205.184
% OF TOTAL	0.3%	3.1%	0.0%	1.3%	0.0%	0.0%	95.3%	0.0%	0.0%	100.0%			
SUB-TOTAL MT	25,430	26,501	27,332	6,823	6,391	1,233	7,921	1,557	957	104,055	100.0%	30.02	288.581
% OF TOTAL	24.4%	25.3%	26.3%	6.6%	6.1%	1.2%	7.6%	1.5%	0.9%	100.0%			
INDUSTRIAL													
EET													
KOFC	38	32	0	3	24	0	3,554	0	4,442	8,095			
- ONFC									2,861	2,861			
SUB-TOTAL, MT										10,956		2.46	224.535
TOTAL ESTIMATED NATIONAL													
INDONES	25,468	26,533	27,332	6,826	6,415	1,233	11,477	1,557	8,260	115,011		32.48	282.408

Source: The Fisheries of the Sultanate of Oman, Annual Report 1987, RDA Contribution # 2-88.

Table 3. Summary statistics for the Fisheries of the Sultanate of Oman for 1985, 1986, and 1987. Landings are estimates based on samples taken at key sites in each statistical region. The numbers of vessels are based on counts made in early 1985 and at the end of the year, 1987. The numbers of fishermen were estimated based on average crew per vessel and the number of vessels counted in each region.

REGION/SOURCE	Numbers of Fishing Vessels			Estimated Numbers of Fishermen Associated w/Vessels			Total Estimated Landings (mt)			Estimated Value (R.O. MILLIONS)		
	1985	1986	1987	1985	1986	1987	1985	1986	1987	1985	1986	1987
MUSANDAM	610	527	643	1,500	1,476	1,063	1,568	1,515	1,852	0.35	0.34	0.39
BATINAH	4,986	5,014	3,748	4,060	4,724	4,076	19,331	20,444	26,515	3.18	3.39	4.38
CAPITAL	1,371	1,283	858	1,820	1,750	1,292	10,706	11,596	12,274	2.86	2.79	2.82
N. SHARKIA	815	1,099	828	2,040	2,553	4,011	16,620	9,206	22,521	5.88	3.44	7.10
S. SHARKIA	531	296	593	910	703	1,758	14,593	21,515	29,224	5.23	7.08	11.10
DHOOFAR	901	901	764	1,370	966	1,314	18,707	18,580	11,669	4.84	4.60	4.24
Total for Traditional Fleet	9,214	9,120	7,434	11,700	11,972	13,514	81,525	82,776	104,055	22.34	21.83	30.82
Total for Industrial Fleet	8	8	8	300	300	300	13,368	13,561	10,956	2.70	2.73	2.46
NATIONAL TOTAL	9,222	9,128	7,442	12,000	12,272	13,814	94,893	96,337	115,011	25.04	24.56	32.48

• The ex-vessel value was based on year-specific average prices for individual species groups.

production, R.O. 30 million in 1987 at ex-vessel prices, gives an average of over R.O. 2,200 per fisherman.

Kingfish, tuna, and small pelagic species each contributed 25% to the total quantity of landings, while the remaining 25% was composed of a variety of species: demersal fishes (8% of total landings) and other large pelagics (7% of total). The traditional fishery primarily pelagic species (kingfish, tuna, sardines, anchovies, mackerels), of which kingfish are the most highly priced; the other resources exploited by the traditional fishery are the lobster resources, shrimp, and abalone, all fetching high prices. The groups of species exploited by the traditional fishery have important implications for a resource management programme, and particularly allocation of resources.

The traditional fishery has undergone, and is still undergoing, a process of changes resulting in its upgrading and modernization. This, in part is due to the support the Government has been providing to the fishery for the last several years. According to official statistics (Table 6) the boat and engine subsidies provided to the traditional fishermen amounted to R.O. 4.1 million over the period of seven years (1980 - 1986). The distribution of the subsidies between geographical areas correlates, in principle, with the share of fish catch such areas contribute to the national total. It is not possible to assess the impact the subsidies had on actual production growth because the statistical information available for years prior to 1985 is not reliable.

2.2.1.b Fish landings

The volume of production in 1987 shows an increase of 28% over that of 1985, however, this may be - at least partly - the result of improved quality of statistics.

One of the salient features of the traditional sector is a diminishing total number of vessels and growing productivity. The total number of traditional vessels declined from 9,186 in 1985 to 7,426 in 1987 (Table 4). This is due to a modernization programme implemented by the Government, under which fibreglass skiffs have been introduced, and replaced a considerable number of houris (decline by approximately 600 equal to 35% of the 1985 number) and shasha (decline by some 1,500 or 53%). The introduction of skiffs caused a shift in employment towards the new vessels, with a negative impact on the traditional dhow fishery.

While in 1983 there were 24 sail-powered fishing boats, and 1618 boats with oars, by 1988 all fishing craft have been motorized.

The modernization did not progress at the same pace in the six statistical regions, some of which, like Capital or Batinah, show a faster modernization trend than others. There were also significant changes in location of vessels between the statistical regions, (especially between Dhofar and the Sharkia), which can only be explained as shifts towards more abundant fishery resources. Table 4 summarizes the distribution of vessels by type and statistical area between 1985 and 1987.

Table 4. Numbers and distribution of fishing vessels in each of the five statistical sampling regions and Musandam. Boat counts from an aerial survey were used for 1985 and 1986. The number of vessels in 1987 was based on a beach survey conducted in December 1987 and January 1988. Numbers of vessels for the Musandam were provided by the Musandam Development Committee.

Vessel Type	Batinah Region			Capital Region			N. Sharkia Region			S. Sharkia Region			Dhofar Region			Musandam Region		
	85	86	87	85	86	87	85	86	87	85	86	87	85	86	87	85	86	87
Shasha	2844	2371	1331	0	10	2	0	0	0	0	0	0	0	0	0	0	0	2
Houra	387	496	460	532	411	258	338	71	224	427	23	163	64	632	29	0	0	1
Launch	0	0	0	0	1	0	182	252	182	27	27	93	3	3	22	225	225	140
Skiff	1485	2002	1894	811	861	580	295	776	422	77	246	337	834	266	713	385	382	35
Other(1)	230	145	63	28	0	18	0	0	0	0	0	0	0	0	0	0	0	499
	<u>4948</u>	<u>5814</u>	<u>3748</u>	<u>1371</u>	<u>1283</u>	<u>858</u>	<u>815</u>	<u>1099</u>	<u>828</u>	<u>531</u>	<u>296</u>	<u>593</u>	<u>901</u>	<u>901</u>	<u>744</u>	<u>610</u>	<u>527</u>	<u>635</u>

	85	86	87
Shasha	2,844	2,381	1,333
Houra	1,748	1,633	1,135
Launch	437	508	465
Skiff	3,877	4,450	4,001
Other	250	145	490
TOTAL VESSELS:	<u>9,184</u>	<u>9,117</u>	<u>7,426</u>

Notes: (1) 'Other' vessels in Batinah and Capital consists of Bedan, which have no full-time crew as they are used only for setting beach seine nets during the sardine season. 'Other' in Musandam refers to vessel types not normally encountered in other regions of Oman.

Table 5. Total landings for the year 1987. Traditional fleet and industrial fleet landings, by major species group and statistical sampling region (where available) area presented. Total estimated landings were approximately 40% higher than those estimated for 1986.

TRADITIONAL FISHING FLEET										
	KINGFISH	TUNA	SMALL PELAGIC	LARGE PELAGIC	SHARK	HAMMOOR	DEMERSAL	CRAYFISH	OTHER	TOTAL
BATIMAH	1441	3457	15726	1645	946	360	2569	2	369	26515
CAPITAL	1394	6370	1722	1300	487	235	666		100	12274
N. SHARKIA	7236	9754	404	1386	1868	312	1431	88	42	22521
S. SHARKIA	15239	6551		2325	3059	228	1139	374	309(1)	29224
DNOFAR	24	312	9480	143	31	98	351	1093	137(1)	11669
MUSANDAM	6	57		24			1765			1852
SUB-TOTAL	25430	26501	27332	6823	6391	1233	7921	1557	957	104,055

INDUSTRIAL TRAWL FLEET										
	KINGFISH	TUNA	SMALL PELAGIC	LARGE PELAGIC	SHARK	HAMMOOR	DEMERSAL	CRAYFISH	OTHER	TOTAL
ALL REGIONS										
KOFC	38	32		3	24		3556		4442	8095
ONFC									2861	2861(2)
SUB-TOTAL										10,956

TOTAL ESTIMATED LANDINGS FOR OMAN, 1987										
	KINGFISH	TUNA	SMALL PELAGIC	LARGE PELAGIC	SHARK	HAMMOOR	DEMERSAL	CRAYFISH	OTHER	TOTAL
ALL SOURCES	25468	26533	27332	6826	6415	1233	11477	1557	8260	115,011

(1) Includes shrimp and abalone landings
(2) Data from ONFC annual report

TABLE 6. AMOUNT OF SUBSIDIES AND NUMBER OF FISHERMEN BENEFITTED BY AREA,
1980-1986 (Amounts of subsidy in R.O. thousands)

YEAR	CAPITAL AREA	SHARQIYA	BATINAH	SOUTHERN REGION	MUSANDAM	TOTAL
1980						
No. of Fishermen	417	364	411	306	140	1638
Value of Subsidy	58.1	71.0	72.0	100.5	55.8	357.4
1981						
No. of Fishermen	322	211	461	207	41	1242
Value of Subsidy	66.2	41.5	74.7	173.6	18.8	374.8
1982						
No. of Fishermen	317	314	1177	252	179	2239
Value of Subsidy	54.7	66.4	218.3	146.1	70.2	555.7
1983						
No. of Fishermen	607	319	918	298	68	2210
Value of Subsidy	276.6	107.1	342.4	75.7	38.2	840
1984						
No. of Fishermen	479	706	632	191	0	2008
Value of Subsidy	156.4	367.9	184.0	137.0	0.0	845.3
1985						
No. of Fishermen	314	507	789	283	0	1893
Value of Subsidy	166.8	263.1	219.0	132.0	0.0	780.9
1986						
No. of Fishermen	89	233	234	190	0	746
Value of Subsidy	36.3	81.2	112.7	93	0	323.2
TOTAL						
No. of Fishermen	2545	2654	4622	1727	428	11976
Value of Subsidy	815.1	998.2	1223.1	857.9	183.0	4077.3
% of Total	20.0%	24.5%	30.0%	21.0%	4.5%	100.0%

Source: Sultanate of Oman, Statistical Year Book, Fifteenth Issue, November 1987

FISH LANDINGS

YEAR 1986 - MT	11,596	30,721	20,444	18,500	1,515	82,776
% of Total	14.0%	37.1%	24.7%	22.3%	1.8%	100.0%

FISH LANDINGS

YEAR 1987 - MT	12,274	51,745	26,515	11,669	1,852	104,055
% of Total	11.8%	49.7%	25.5%	11.2%	1.8%	100.0%

Source: The Fisheries of the Sultanate of Oman, Annual Report 1987, ROA
Contribution # 2-88

2.2.1.c Fishermen

In 1987 the total number of traditional fishermen was estimated at approximately 13,500, a 20% increase over the previous year. The increase seems to be the result of a significant increase in the number of part-time fishermen. In the absence of census data, the 1987 statistics are taken as a basis for further considerations.

The formal education and training of the fishermen is rather low, but in fishing techniques traditionally practiced their professional skills are extremely well developed. Modernization of the traditional sector will require that both new types of vessels and gear be introduced. The trainability of the fishermen, understood as their ability to develop the skills demanded by new fishing equipment, will have to be established. The nation-wide literacy level is 13.5%, with considerable differences between regions. The lowest rate is found in Musandam (1.8%), while the highest is in the Dhofar (32.5%). These findings have obvious implications for training programmes. In view of the overall low level of literacy among fishermen written materials would have little impact. Alternative training methods will have to be adopted. As time goes on, however, and more young men graduate from schools, the literacy rate will certainly grow.

A socio-economic survey carried out in 1985 (Socio-Economic Aspects of the Fisheries in Oman, RDA, June 1984) indicates that the population of fishermen is ageing, and that there is a reluctance on the part of younger generation to engage in this occupation. While the majority of the fishermen were within the age groups considered as those of a productive labour force (between 20 and 50), most were in the older groups and there was a very small number (4%) of fishermen below the age of 20. The reasons for this phenomenon appear to be that fishing, in its present form, is too arduous, with inadequate returns and low social status.

A multitude of approaches will have to be developed--within the overall long term development programme -- to recruit the younger people into the profession, to upgrade their skills and income, and to upgrade the social status of fishermen.

2.2.1.d Infrastructure (provided by the Government)

The existing infrastructure is summarized in Tables 7 and 8. The total fish storage capacity in the Sultanate is 4405 mt, with 192 mt of ice production per day. Up to 243 mt of fish can be blast frozen each day. However, little information is available on the actual level of utilization of these facilities.

The striking feature presented in the summary is the lack of landing facilities in most of the locations, although ice plants and cold stores have been constructed there. The only existing landing facilities are in the Musandam, at Muttrah (Capital), Masira Island Kuria Muria, and Mirbat. The jetties referred to above can be used for vessels up to 3 metres draft. It should also be noted, however, that the Muttrah landing facility is limited to the space at present used by trawlers at the commercial harbour. Development of fisheries will require specialized fisheries facilities ashore, as well as

Table 7

Location of Fisheries Infrastructure in Oman, 1987
(Proposed and Existing)

	Workshop	Landing Facility	Ice Plant	Cold Store
Musandam				
Khasab	E	E	E	E
Bayah	E	E	E	-
Lima	-	E	-	-
Batinah				
Shinas	E	-	-	-
Sohar	E	P	E	-
Saham	E	-	-	E
Al Khabura	E	-	-	-
Undetermined	-	P	-	-
Capital				
Seeb	E	P	-	-
Ghala	-	-	-	-
Muttrah	E	E	-	E
Quriyat	E	P	E	E
Undetermined	-	P	-	-
Northern Sharkia				
Sur	E	P	-	-
Al Ashkharah	E	P	E	E
Southern Sharkia				
Masira Island	E	E	E	E
Al Neqda	-	P	-	-
Mahout	E	-	-	-
Duqm	E	P	E	E
Dhofar				
Soqra	E	P	E	E
Sharbitat	E	-	E	E
Shuwalmiya	E	-	E	E
Hasik	E	P	E	E
Kurta Muria	E	E	E	E
Sudah	E	P	E	E
Mirbat	E	E	E	E
Taqah	E	-	-	-
Salalah	E	-	-	-
Raysut	-	P	E	E
Rakhyut	-	-	-	E

Source: Directorate General of Fisheries, unpublished survey.

TABLE 8. EXISTING PRODUCTION FACILITIES

<u>Company</u>	<u>Ice Plant MT/Day</u>	<u>Cold Store M Tons</u>	<u>Freezer MT Day</u>	<u>Chill Room M Tons</u>
Oman Fishing Co.				
Muscat	42	2000	20	10
Masirah	20	250	20	50
Salalah	15	250	15	5
Buraimi	10	60	-	30
Ghala	-	50	13	-
Sohar	10	100	20	25
Al Ashkara	10	100	20	25
Duqm	10	100	20	25
Soqra	5	25	-	25
Shuwaimiya	10	100	20	25
Sharbitat	5	25	-	25
Hasik	5	25	-	25
Sudah	10	100	20	25
Kupla Muria	-	100	20	25
Rakhyut	-	100	20	25
Niswa	10	125	-	25
Sudah Marine				4
Salalah	10	60	5	5
Protein Products				
Muscat	5	65	10	-
Zawrak				
Muscat	-	40	5	-
Oman Sea Farms				
Sur	-	60	5	-
Musandam				
Khasab	15	200	10	80
TOTAL	192	3935	243	470

mooring space for vessels. This applies also to other locations, where facilities are planned in the near future.

2.2.15 Private Sector

A number of private companies support the traditional fishery in fish processing. Only one company currently operates a fishing vessel. Their operations are important from the point of view of present and future involvement in the various activities of the industry.

The most important them is the newly-created para-statal Oman Fisheries Company, which is inheriting 15 facilities built by the Government. Other companies, such as United Gulf Fisheries (OMINVEST), Protein Products, Sudah Marine Products, and Zawrak either have built, or are planning to build, their own processing facilities.

An increased involvement of the private sector in the development of Omani fisheries will require a gradual (commensurate with growth in landings) increase in ice production, cold storage, freezing, and drydocks and repair facilities. The private sector would be expected to invest in such facilities.

2.2.16 Marketing

In the absence of more recent reliable information the marketing structure may be illustrated by figures reported by FAO (1984). Of the total of all landings of all species made by artisanal fishermen, 32.5% was sold to consumers in fresh, in-iced form; 12% reached the consumer as iced fish (predominantly higher priced large pelagic species sold inland and exported); 8% was reaching the consumers in frozen form having been sold to either the Government or to the ONFC at Muttrah, Masira or Salalah; 8% was consumed by the fishermen and their families; 26%, anchovies and sardines, were dried for animal feed; 4% were cured for human consumption-predominantly inland; and, 9% were lost in handling and transport.

A 1986 review estimated the fresh fish sales in Oman at about 57,000 mt. Thanks to a reasonable network of roads, and the development of about 500 fish this fish is being transported from the landing places to consumption centres both in urban and rural areas. Retailing takes place at fish markets (at suqs), but the standard of suqs needs radical improvements. Changes are also required at beach landing points, where the fish is still sold "by the piece". A continued rigid adherence to this system could hinder Oman's capacity to compete in the world marketplace with its fish products.

There are sixteen government-owned fish sales units in the country. Their performance has not been as good as expected. These will be absorbed by Oman Fishing Co.

The quality and assortment of Oman-origin frozen fish products requires urgent attention if domestic sales of fish are to increase beyond their present level. Except for very remote locations, the

domestic market seems to be adequately supplied with fish. Further increases in consumption may depend on improvements in quality and marketing practices.

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 Japan, and some premium quality fish (snapper, grouper) to markets in the Gulf, Jordan, and to a 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, but are probably around 20,000 mt.

2.2.2 The Trawler Fishery

The trawler operations are carried out by seven foreign vessels operating under a concession agreements which expires in early 1989. In addition, one small domestic trawler is currently operating, the trawlers have freezing facilities on board and land frozen fish, ready for marketing. The target species are demersals, although small quantities of pelagic species are reported in the foreign fleet's catch.

The total landings of the industrial fleet declined from 13,368 mt in 1985 to 10,956 mt in 1987. In 1987, the ONFC reported total landings of 2,861 mt, or 26% of the industrial fleets' catch.

The situation is likely to change dramatically once the Oman Fishing Company develops its industrial fishing plans.

3.0 DEVELOPMENT CONSTRAINTS

Effective fisheries development is a dynamic process requiring the presence and interaction of a number of factors. The crucial ones are listed below:

1. A resource capable of sustaining adequate yields over an extended period of time must be present.
2. A market must exist or be developed for the resource.
3. An adequate number of skilled fishermen must be available to harvest the resource.
4. The fishermen must have suitable boats and equipment to assure sufficient production and adequate quality of the fish.
5. Shoreside infrastructure must be in place to enable the absorption of fish landed; and, handle, process and market the fish economically.
6. An institutional framework must exist to (a) manage the resources and assure their sustained productivity, and (b) assist the fishermen in achieving objectives of the national economy as well as their business objectives.
7. A legal framework must exist to ensure the rights of the fishermen and to protect the resources from domestic abuse and foreign competition.

All seven factors must be in place for the fisheries sector to develop. The absence of any one factor may thwart development, cause the failure of a particular project, or erode public and government confidence in the development process. Thus it is essential that a coordinated effort is made to address all the factors in a concerted manner. This is the approach which has been taken in the Sultanate of Oman, and the list of accomplishments to-date is impressive. But fisheries in Oman are at a crossroads, and there still are major constraints hindering progress. These constraints and the current status of activities to overcome them are summarized below.

(1) Knowledge of resources potential

The potential yield of the various fishery resources in the waters of Oman is known only in general terms. The Second and Third Five Year Plans addressed this constraint and steps are underway to enhance the statistical system and resource assessment programmes. The activities of the Marine Science and Fisheries Centre (MSFC), in close cooperation with the Directorate General of Fisheries, should produce information essential for allocation of total allowable catch (TAC). The resource survey, due to start in early 1989, should provide the basis for a continuing stock assessment programme. It will be several years, however, before comprehensive information on the fish stocks is available.

(2) Market development

Most marketing efforts have focused on the domestic market (as they should, given the demand and current level of fisheries development). The marketing system has developed rather rapidly, with strong Government support, however, little has been done to improve fish handling methods and quality in general. The marketing of fish took off from the point at which the traditional way of selling fish was before the developments took place. Handling fish in general, and especially assurance of its quality, have largely remained traditional. The domestic market, with perhaps the exception of extremely remote areas, is well supplied in fish. The possibility of increasing domestic fish consumption is limited, and depends on better product and improved distribution. Upgrading of quality of fish sold, and the quality of retail outlets needs yet to be resolved.

If the fishery sector is to become a major foreign exchange earner, considerable market research and assistance to exporters is required. Improvement of quality of fish is a prerequisite for increased exports.

(3) Availability of skilled fishermen

Omani fishermen are very knowledgeable and highly skilled in using the boat and fishing equipment currently available. Two concerns have emerged from the work carried out so far. Firstly, the socio-economic survey showed that young people are reluctant to enter the occupation. Secondly, the modernization of the traditional sector will require new boats and gear, and fishermen will have to acquire additional skills to operate them. Training is a long process, and therefore the ways and means of training the existing fishermen in new skills will have to be given particular attention.

(4) Fishing vessels and equipment

The Fishermen's Encouragement Fund has had a significant impact on modernization of the traditional inshore fleet. To take full advantage of underutilized resources, however, a fleet of larger and more modern vessels will have to be introduced. The related problems are training of fishermen and existence of infrastructure facilities. Furthermore, as it is the fishermen who will make the final investment decision-buy new vessels - the superiority of the proposed new boats and fishing techniques will have to be demonstrated to them, both in technical and economic terms.

(5) Shoreside infrastructure

The two previous Five-Year Plans have made considerable progress in providing shoreside infrastructure, especially in cold stores, ice plants and engine repair shops. The elements of infrastructure which have not yet been developed are fishing harbours and other landing facilities. Their construction entails a far-reaching and costly programme; the process of feasibility studies, design and construction is quite lengthy. Thus it will be some time before an adequate infrastructure network is in place. The feasibility studies must be based on solid data, both in terms of present and projected landings, number of vessels etc., as well on socio-economic data. Both categories of data are only now becoming available.

(6) Institutional framework

The Directorate General of Fisheries (DGF) is the primary Government Agency in charge of fisheries development, management of fishery resources, assistance to fishermen and the industry at large, and implementation of Government policies for the sector.

The Directorate General of Fisheries faces several serious problems which, unless overcome within a reasonable time span, may hinder the development process. The root cause of all the problems seems to be an insufficient number of adequately qualified professional staff.

Two major capabilities are inadequately developed in the DGF at present, due to lack of qualified professional staff:

- (i) the ability to manage the resources;
- (ii) an efficient extension service.

With regard to management of resources, the starting point is reliable up-to-date stock assessment information. The Marine Science and Fisheries Centre (MSFC), an arm of the Directorate General of Fisheries, should have as its primary task the provision of such information -- as a basis of TAC allocation and management of resources in general -- for the DGF. The latter, however, being responsible for collection of statistics, has to provide the MSFC with the necessary statistical information. A close coordination and cooperation are essential for the accomplishment of the resources management task.

Training of staff for the DGF, both on-the-job and institutionalized training are the key to gradual strengthening of the Directorate.

(7) Legal framework

The Sultanate has promulgated a basic fishery law providing for control of exploitation of the marine resources within Oman's Exclusive Economic Zone (EEZ). The implementation of this law, and the establishment of resources management and development regime, will require that detailed rules and regulations are developed in areas such as licensing, reporting of statistics, stock management, and conflict resolution. Developing the capability to enforce the rules and regulations is equally important.

The constraints in this field are thus the inadequacy of detailed rules and regulations and the lack of DGF capability to enforce such rules and regulations. It will be some time before the rules and regulations are promulgated and before the DGF can build its capacity to develop, monitor and enforce them.

4.0 THE PLAN

4.1 STRATEGY

This Fisheries Development Master Plan covers the time span up to the year 2010, and its major components have been developed within five-year intervals (years 1991 considered a starting point, 1996, 2001, 2006 - and 2010 as the final target of the plan) to coincide with the five year development planning cycle prevailing in Oman. The actual statistical base on which the components of the plan have been developed is the year 1987 - the last full year for which statistics are available.

The overall strategy adopted in this document aims at a full rational exploitation of fishery resources, on a sustainable basis, within the EEZ of Oman. The objectives of the plan, in line with the overall national development objective of diversification of the economy, are:

- improvement in incomes, living standards, and status of traditional fishermen;
- increased nutritional standards, at lower cost as the industry becomes more efficient;
- import substitution;
- growth in supply and service industries, employment therein and in value added processing of fish products;
- further employment prospects for citizens;
- economic investment projects for the use of national sources of capital.

These objectives apply both to the traditional sector and to the industrial fisheries.

The attainment of these objectives will be made possible through the contribution of the individual components of this plan.

Increase in fish landings will contribute to the improvement of incomes, living standards, and status of the fishermen. At the same time the increased availability of fish at reasonable prices will contribute to the improvement of nutritional standards. Import substitution, and increased exports of fish, will contribute to the attainment of the foreign exchange saving/earning objective.

The input to the attainment of the increased employment objective will come through increase in the size and standards of the fishing fleet, generation of employment in ancillary industries and services, fish processing, marketing, transport, etc. Processing of fish and, in general, better handling of fish will contribute to the value added in the national economy.

Finally, the investment opportunities for Omani capital will arise as the private sector develops vessels and processing facilities - following the development of basic infrastructure by the Government.

The entire plan has as its underlying principle the contribution of fisheries to the attainment of national economic and social policy objectives, through rational utilization of the fishery resources, and development of this sector.

The role of the Government is seen as one of stimulating the development through proper management of the resources and creation of favourable conditions for development. The latter includes the just and timely allocation of fishing quotas, provision of training,

extension services, and credit, as well as infrastructure facilities. Infrastructure emphasis is on fishing harbours landing facilities, roads, power, and water. Strengthening of Government institutions, particularly the Directorate General of Fisheries, is a prerequisite for the implementation of the strategy. This indicative plan places particular emphasis on elimination of constraints to fisheries development discussed in the preceding section.

The private commercial sector is expected to invest in the fisheries, both in vessels and fishing equipment, and in shoreside infrastructure, notably processing facilities, cold storage complexes (ice, freezing, storage), transportation, ancillary services. The Government's role in this connection will be to assist the private sector by allocating catch quotas -- within the overall resources management framework (TAC) -- and facilitating the establishment of companies in accordance with the overall national policy in this respect.

The traditional fishery will retain its role as a primary producer of fish for the domestic market. The resources exploited by the traditional fishery will be reserved for this sector, with a possibility of further expansion made possible by more efficient boats. The fishery will require considerable upgrading and modernization, as will the skills of the fishermen and their social status. Infrastructure, particularly with regard to landing facilities, will have to be provided along with the introduction of more modern boats to be used by the traditional fishermen. As investment decisions, notably acquisition of new boats, will remain the responsibility of the traditional fishermen, the Government will create an appropriate business climate and provide assistance to encourage this development process. Production targets, therefore, have to be seen as a desirable production level to be attained by the traditional sector. Traditional fishermen can become more economically efficient and growth oriented with training and financial support. The skills of their seamanship and knowledge, the commitment to a seagoing culture and living on the oceans edge, place the traditional fishermen at the centre of the considerable fisheries potential of the country.

The role of the fisheries administration, and notably the Directorate General of Fisheries cannot be overemphasized. The removal of institutional as well as legal constraints hinges on the quality of the work of DGF and thus is a key factor in a successful implementation of the long term plan.

4.1.1. Plan Summary

The major actions required to develop the fisheries sector are listed below in time segments corresponding to the Government's five-year plans. Only non-recurrent costs are reflected. The rationale for each of these activities is explained in subsequent sections.

1989 - 1990

1. Formulation and publication of Government policies with regard to private sector participation in the processing and marketing of seafood products.

2. Formulation and publication of Government policies with regard to private sector participation in the processing and marketing of seafood products.
3. Expansion of resource assessment activities within the Marine Science and Fisheries Center, including implementation of a resource survey using a chartered research vessel. Cost = RO 1,000,000.
4. Expansion of training programs for fisheries biologists, fisheries administrators, fisheries extension agents, and fisheries inspection and enforcement officers. Cost = RO 100,000 + donor funding.
5. Development of fishing harbour master plan. Cost = RO 50,000.
6. Promulgation of fish quality assurance guidelines and regulations.
7. Analysis, design, and tendering of 10 m and 15-18 m workboats for the extension program.
8. Detailed planning, design, and tendering for construction of a fisheries training institute, including a training vessel. cost = RO 50,000.
9. Review and revision of Government procedures and regulations with regard to fishing boat licensing and enforcement of fisheries laws.

1991 - 1996

1. Continuation of resource assessment activities, including at least 12 months of resource surveys using a chartered vessel. Cost = RO 1,000,000.
2. Continuation of training programs for Government fisheries staff. Cost = RO 250,000 + donor funding.
3. Expansion of Extension Services vessel demonstration program, including acquisition of 10 meter and 15-18 meter demonstration vessels. Cost = RO 350,000.
4. Investment by traditional fishermen in 900 up-graded boats. Cost to fishermen = RO 38,000,000 (to be partially offset by Government assistance.)
5. Investment by private sector in 21 industrial fishing vessels. Cost = RO 4,400,000 (financing by Agriculture and Fisheries Bank).
6. Investment by private sector in processing plants and ancillary services. Cost = RO 13,960,000.
7. Detailed design and construction of four major harbours at

Capital, Sur, Duqm, and Raysut, and five smaller harbours at Batinah, Quriyat, Al Ashkara, Hasik, and Sudah. Phase I cost = RO 25,000,000.

8. Construction and operations of Fisheries Training Institute. Cost = RO 3,000,000 for 1993 - 1995 operations.
9. Procurement of training vessel for Fisheries Training Institute. Cost = RO 400,000.
10. Implementation of fisheries education program in schools and public media. Cost RO 1,000,000.

1996 - 2000

1. Continuation of resource assessments. Information from commercial fleet.
2. Continuation of Extension Services demonstration and training programs.
3. Investment by traditional fishermen in 382 up-graded boats. Cost to fisherman = RO 11,700,000 (to be partially off-set by Government assistance).
4. Investment by private sector in 13 industrial fishing vessels. Cost = RO 3,400,000 (financing by Agriculture and Fisheries Bank).
5. Investment by private sector in processing plants and ancillary services. Cost = RO 5,100,000.
6. Phase II Harbour development at same nine sites. Cost = RO 20,000,000.
7. Design and construction of drydock and marine railway at Capital or Sur. Cost = RO 7,000,000.
8. Implementation of consumer education program promotion seafood products, domestic and export. Cost = RO 300,000.
9. Continuation of Fisheries Training Institute. Cost of operations = RO 5,000,000.

2001 - 2010

1. Continuation of resource assessments. Information from commercial fleet.
2. Continuation of Extension Services demonstration and training programs.
3. Investment by traditional fishermen in 565 up-graded boats. Cost to fishermen = RO 14,600,000 (to be partially offset by Government assistance).
4. Investment by private sector in 22 industrial fishing

vessels. Cost = RO 8,800,000 (financing by Agriculture and Fisheries Bank).

5. Design and construction of second smaller drydock at unspecified location. Cost = RO 2,000,000.
6. Continuation of Fisheries Training Institute. Operating Costs = RO 10,000,000 for ten years.

4.2 FISHERY RESOURCES AVAILABILITY

The current stock information is adequate for the first stages of development, but not for fine tuning the fishery. The probable safe yields, based on present knowledge, have been discussed in Section 2.1 of this document, and are taken here as a foundation for the development of the fishery. The possible yields can be verified as the fishery develops and research programmes continue. The potential yields may have to be amended as and when new knowledge of the status of the resources becomes available, and substantial differences are identified.

As the traditional fishery is the primary concern of the Government, fishery resources for that segment of the national industry have to be earmarked on a priority basis. The nature of the fishery resources and the degree of detail of the available information necessitate a general, rather than specific, consideration of preliminary allocation of resources for the purpose of this plan. The overall policy of the Ministry, and allocations of resources for the industrial sector already made, or to be made, will have the protection of the traditional sector fisheries as their important objective.

The greatest potential for development is represented by the resources of small pelagic fishes. This group is composed of a variety of species, including sardines, scads, and anchovies. Their utilization and marketing may pose problems. Out of the total available potential of 284,000 mt the small pelagic species constitute as much as 232,500 mt. Most of the potential, viz. 192,500 mt is to be exploited by the industrial sector.

Demersal resources, as well as tunas, offer a relatively limited scope for development. Out of the total available 29,000 mt of demersal species, 10,000 mt will be required to satisfy the projected needs of the traditional sector. As far as tunas are concerned, out of the additional available potential of 13,500 mt the traditional sector will need two-thirds, or 9,000 mt. the remainder is projected for exploitation by the industrial sector.

Table 9 contains a preliminary analysis of the unutilized resources available and shows their distribution as reflected in this plan. Priority has been given to traditional fishermen, and the incremental amount of fish to be caught by them is earmarked as 68,000 mt. This constitutes an increase of 64% over the 1987 catch; the average annual rate of growth is 2.3%. The projected growth rate has been arrived at taking into consideration (i) the limitations on availability of manpower in this sector and, (ii) the fact that the

TABLE 9. UNUTILIZED RESOURCES AND THEIR DISTRIBUTION BY SECTOR

Metric tons

	UNUTILIZED RESOURCES (1)	NEEDS OF TRADITIONAL FISHERMEN (2)	AVAILABLE FOR INDUSTRIAL FISHERY (3)	INDUSTRIAL VESSELS TO HARVEST THE AVAILABLE POTENTIAL		
				TYPE OF VESSEL	APPROXIMATE VESSEL SIZE (LENGTH-METRES)	NUMBER OF VESSELS (4)
Small pelagic						
Gulf of Oman	42,500	20,000	22,500	SEINER	25	5
Arabian Sea	190,000	20,000	170,000	SEINER/TRAWLER	25	30
Tuna						
Gulf of Oman	10,000	5,500	4,500	MULTIPURPOSE	20	2
Arabian Sea	3,500	3,500	0			
Shark/other pelagic						
Gulf of Oman	500	500	0			
Arabian Sea	9,500	9,500	0			
Demersals						
Gulf of Oman	3,000	3,000	0			
Arabian Sea	26,000	7,000	19,000	TRAWLER	25	19
Total						
Gulf of Oman	284,000	68,000	216,000			
Gulf of Oman	56,000	29,000	27,000			
Arabian Sea	228,000	39,000	189,000			

Note: (1) Available resources as calculated in Table 1.
 (2) Needs of traditional fishermen estimated on the basis of an estimated average annual growth rate of 2%.
 (3) The difference between (1) and (2) is planned to be harvested by the private sector.
 (4) The size of vessel, and therefore their numbers are estimates subject to detailed feasibility studies by investors (private sector).

sector will have to undergo considerable modernization. Existing types of fishing boats will be replaced by more modern ones, especially since the existing fleet is ageing and requires renewal. The determination of fishing areas reserved for the traditional fishermen will be made on the basis of a resources management plan and established resources allocation principles.

The traditional sector has been given priority as far as exploitation of kingfish and crayfish are concerned, as well as other resources within the inshore areas. It should be noted, that due to resources limitations no increase in production of kingfish or lobster is projected.

The potential for exploitation by the industrial sector is estimated at 227,000 mt, giving an increase over 1987 production of 216,000 mt. Of this latter total, only 19,000 mt are demersals, the rest being small pelagic species. Table 9 shows the break-down between the species groups as well as between the Gulf of Oman and the Arabian Sea. It must be noted that these projections do not include possible large populations of deep sea demersals and squid, of which the resources are unknown.

The projection of the gradual increase in the exploitation of resources by both the traditional and the industrial sectors are given in Table 10, supported by Table 11 with regard to projected phasing-in of industrial vessels.

4.3 FISHING VESSELS

4.3.1 The Industrial Fishery

Availability of resources, by group of species and sea area (Table 9), constitutes the basis for projections of type and number of industrial vessels. The total catch of the industrial fleet by the year 2010 has been projected at 229,000 mt, of which 218,000 mt constitute an increase over the 1987 catch.

The type of vessels to fish the groups of resources available by the year 2010, and their numbers are as follows:

Area/species group	MT - available	Type of vessels	No. of vessels
Gulf of Oman:			
Small pelagic	22,500	seiners (LOA 25m)	5
Tuna	4,500	multipurpose (LOA 20m)	2
Arabian Sea:			
Small pelagic	170,000	seiner/trawler (LOA 25m)	30
Demersals	19,000	trawler (LOA 25m)	19

The phasing-in of these vessels is shown in Table 11. It is anticipated that a full exploitation of the small pelagic resources in the Arabian Sea, which constitutes the bulk of the potential for growth of total catch, will have to take place gradually, over a period of 15 - 20 years. This development is contingent on two factors:

- (1) availability of harbours to accommodate the fleet in the

Table 10. PROJECTED GROWTH IN FISH CATCH 1991-2010, BY TYPE OF FISHERY
Metric tons

Type of fishery // Year	1987	1990	1995	2000	2005	2010	INCREMENT 2010-1987
Traditional Fishery	104,055	110,500	134,000	145,000	155,000	163,000	59,000
Industrial Fishery	10,956	12,000	60,000	111,000	173,500	236,000	225,038
Total	115,011	122,500	194,000	256,000	328,500	399,000	284,000

Table 11. PROJECTED INTRODUCTION OF ADDITIONAL INDUSTRIAL VESSELS, 1990-2010

	1987	1990	1995	2000	2005	2010	INCREMENT 2010-1987
Annual catch	10,956	12,000	60,000	111,000	173,500	236,000	225,000
of which:							
Demersal	11,000	12,000	25,000	39,000	39,000	39,000	28,000
Pelagic	0	0	35,000	72,000	134,500	197,000	197,000
Increment in catch over previous period	x	1,000	48,000	51,000	62,500	62,500	225,000
of which:							
Demersal	x	1,000	13,000	14,000	0	0	28,000
Pelagic	x	0	35,000	37,000	62,500	62,500	197,000
Vessels to be introduced							
Seiner	x	0	3	2	0	0	5
Seiner/trawler	x	0	3	5	11	11	30
Multipurpose	x	0	2	0	0	0	2
Trawler	x	4	9	6	0	0	19
New vessels by region:							
Gulf of Oman:							
Seiners	x	0	3	2	0	0	5
Multipurpose	x	0	2	0	0	0	2
Arabian Sea:							
Seiner/trawler	x	0	3	5	11	11	30
Trawler	x	1	12	12	0	0	25

TABLE 12. PROJECTED TRADITIONAL FLEET COMPOSITION - YEAR 2010

	1907	1990	1995	2000	2005	2010
Total catch - mt	104,035	120,000	135,500	150,000	160,500	170,000
Increase in catch over 1907		16,000	31,500	46,000	56,500	66,000
Increase in catch over previous			15,500	14,500	10,500	9,500
No. of Boats						
Shasha	1,333	1,200	700	300	0	0
Hourr	1,135	1,000	800	700	600	500
Launch	465					
Skiff	4,001					
Other	490					
Fiberglass skiff		4,000	3,700	3,500	3,200	3,000
Aluminium skiff		100	100	100	100	100
Dhow		350	250	200	200	200
Bedan		50	50	50	50	50
9 metre workboat		200	500	800	1,000	1,300
15 m multipurpose		235	400	479	547	547
Production/boat types(mt)						
Shasha's	1,333	1,200	700	300	0	0
Hourr's	51,075	45,000	36,000	31,500	27,000	22,500
Launches	25,575					
Skiff's	20,005					
Other's	4,860					
Fiberglass skiff		20,000	18,500	17,500	16,000	15,000
Aluminium skiff		300	300	300	300	300
Dhow		17,500	12,500	10,000	10,000	10,000
Bedan		2,500	2,500	2,500	2,500	2,500
9 metre workboat		10,000	25,000	40,000	50,000	65,000
15 m multipurpose		23,500	40,000	47,900	54,700	54,700
		96,500	95,500	102,100	105,000	115,300
Total		120,000	135,500	150,000	160,500	170,000
Note:						
Catch per boat (mt/year):						
Shasha						1
Hourr						45
Launch						55
Skiff						5
Other						14
Fiberglass skiff						5
Aluminium skiff						3
Dhow						50
Bedan						50
9 metre workboat						50
15 m multipurpose						100

- southern part of the Sultanate;
- (iii) development of markets for small pelagic species or their economic utilization for fishmeal or uses other than direct human consumption.

A full exploitation of demersal resources, tuna, and small pelagics in the gulf of Oman has been projected to commence between 1990 and 1995. The annual value of industrial production at 1988 prices is expected to be R.O. 42.7 million from year 2007 onwards. The very high percentage of small pelagic fishes in the total projected catch is keeping the value of production relatively low. The net present value of the incremental catch to be landed by the projected fleet is R.O. 99.2 million over the economically useful life of the fleet (20 years), at a discount rate of 10%. The total cost of investment in the vessels alone is estimated to be R.O. 16.6 million (Table 13), thus the present value index (on the hypothesis that the total investment is made in 1989) is as high as 5.98. This index is given here as an overall indication of the expected high return on investment. A further analysis is carried out later in this document. Introduction of the industrial fleet on the projected scale cannot take place without the provision of infrastructure, especially harbours, and without development of markets. Investment, by the Government, in infrastructure will reduce the high present value index shown for the industrial fleet.

4.3.2 The Traditional Fishery

The projections of vessels for the traditional fishery have been made in consideration of (a) the ageing of the existing boats and the relatively low efficiency of some of the types presently in operation, and (b) the need to modernize the sector in order to achieve the objective of improving the income of fishermen, increasing their social status, and increasing production of fish for the domestic market.

The numbers of projected new types of boats to be introduced have to compensate for the decline in catches due to phasing-out of old boats and for increase in catches, according to the production projections of this plan. The projected composition of the traditional fleet over the period 1990 - 2010 is given in Table 12. The total number of boats is reduced from 7,424 in 1987 to 5,697 in 2010. The main reduction stems from the projected total elimination of shashas and reduction in the number of skiffs. It is envisaged that a total of 1,500 fishing workboats 9 metres long will be introduced, together with 547 multipurpose vessels 15 metres long. Both types are presently not known in Oman, and their introduction is considered to bring in a new quality of equipment to the industry. Their productivity, and therefore economics, are better than those of the existing types of vessels.

The introduction of the new vessels is contingent upon:

- (i) provision of adequate, specialized fishing harbours;
- (ii) demonstration of their viability to the fishermen, through a well functioning extension service;
- (iii) continuation of financial assistance to fishermen who want to acquire the new boats, through the Fishermen Encouragement Fund;

Table 13. INVESTMENT IN NEW VESSELS 1990-2010

	1990	1995	2000	2005	2010	Total
No. of boats/ood period						
A. Traditional fleet						
9 m workboats	200	300	300	200	300	1300
15 m multipurpose boats	235	400	482	547	547	2411
Total - traditional	435	700	782	747	847	3711
B. Industrial Fleet						
Seiners	0	3	5	5	5	18
Seiner/trawler	0	3	8	19	30	60
Multipurpose trawler	4	2	2	2	2	12
		13	19	19	19	60
Increment over previous period						
A. Traditional fleet						
9 m workboats	200	300	300	200	300	1300
15 m multipurpose boats	235	165	82	65	0	547
Total - traditional	435	465	382	265	300	1847
B. Industrial Fleet						
Seiners	0	3	2	0	0	5
Seiner/trawler	0	3	5	11	11	30
Multipurpose trawler	4	2	0	0	0	2
Total Industrial	4	17	13	11	11	54
Investment cost - R.O.						
A. Traditional fleet						
9 m workboats	4,000,000	6,000,000	6,000,000	4,000,000	6,000,000	26,000,000
15 m multipurpose boats	16,450,000	11,550,000	5,740,000	4,550,000	0	38,290,000
Total - traditional	20,450,000	17,550,000	11,740,000	8,550,000	6,000,000	64,290,000
B. Industrial Fleet						
Seiners	0	360,000	240,000	0	0	600,000
Seiner/trawler	0	1,200,000	2,000,000	4,400,000	4,400,000	12,000,000
Multipurpose trawler	800,000	240,000	0	0	0	240,000
		1,000,000	1,200,000	0	0	3,600,000
Total Industrial	800,000	3,600,000	3,440,000	4,400,000	4,400,000	16,640,000
Grand total	21,250,000	21,150,000	15,180,000	12,950,000	10,400,000	80,930,000

Unit prices = R.O.

A. Traditional fleet

 9 m workboats 20000
 15 m multipurpose boats 70000

B. Industrial Fleet

 Seiners(sardine) 120000
 Seiner/trawler 400000
 Multipurpose trawler 200000

(iv) provision of training to the traditional fishermen, but particularly to young persons wishing to engage in this occupation. The provision of training would also be aimed at the objective of retaining the population in the present rural areas, and upgrading the social status of the fishermen.

While the selection of detailed types of boats and their introduction will have to be preceded by a detailed economic feasibility analysis, the projections show that the introduction of new vessels will cost some R.O. 64.3 million (Table 13). The value of the annual increased catch of 68,000 mt is estimated to be R.O. 32.2 million, and the present value index over the economically useful life of the vessels is calculated to be 1.88, at a discount rate of 10%.

4.4 FISHING HARBOURS

Protected harbours along the coast of Oman are prerequisite for the development of the country's fishing industry. Lack of specialized fishing harbours has been identified as the major constraint to fisheries development. Several studies have been made to determine the required capacity and location, of harbours and a Harbours Master Plan is about to be tendered. The background document of particular importance is the "Development of Fishing Harbours in the Sultanate of Oman", RDA Contribution No. 1-88.

The important goals of increased fishery production and continued, harmonious fishery development cannot be reached without substantial investment in harbour infrastructure. Such an investment is the responsibility of Government, within its programme of stimulating fisheries development. While the investment cost is to be borne by the Government, the running costs of harbours -- in the long term -- will have to be offset by the private sector, in the form of fees for use of harbour facilities. The principle of the operation should be: "user pays".

Large fishing harbours will be required for industrial scale fishing operations and for extended range traditional fishing. In view of the need to export additional substantial quantities of fish over the national demand such harbours would have to have either seaborne or airborne connections for shipping fish out of Oman. Detailed planning for location of harbours, in addition to regular engineering considerations, will have to take into account the proximity of the most productive fishing grounds in order to reduce steaming time and cost of the fishing fleet; and what is equally important for the traditional fishery and the new boats to be used by it -- the fishermen communities. Harbours too far away from the villages and towns where fishermen live and have lived for generations, may not be appreciated by the traditional fishermen. There is a strong social aspect to planning for harbours development for the traditional sector. The question is, therefore, whether there should be a larger number of small harbours located in strategic areas. The advantages and disadvantages of either solution will have to be considered very carefully.

The projections made below are of a conceptual nature for preliminary allocation of financial resources to cover the harbour needs. Engineering and social analysis will have to verify the projections, and will constitute a basis for actual investment decisions.

The projection of harbour needs are based on the targeted fish landings in the year 2010, i.e. a total of approximately 390,000 mt, of which 100,000 mt is to be harvested in the Gulf of Oman, and 290,000 mt in the Arabian Sea. The distribution by economic sector provides for 172,000 mt to be caught by the traditional sector and 227,000 mt by the industrial fleet. Distribution between the geographic areas and sectors is given in Table 9. The projected composition and geographic distribution of the industrial fleet is given in Table 11, while the composition of the traditional fleet is contained in Table 12.

It is anticipated that a significant number of the workboats of 9 metres in length will require haul-out facilities (ramps, winches) and related fish handling facilities ashore.

TABLE 14. SUPPORT OF HARBOUR PROJECTIONS, 1991-2010

Location	No. of larger boats	No. of smaller boats	Volume of fish mt/year	Investment cost - R.O.
Capital Area	10	100	70,000	8,000,000
Ser	30	200	120,000	11,000,000
Dugn Area	20	200	70,000	8,000,000
Raysut Area	20	200	70,000	3,000,000
Five smaller harbours - location as shown in the text each capable of handling/avera	0	250	20,000	3,000,000
- total small harbours	0	1250	100,000	15,000,000
Grand total	80	1950	430,000	45,000,000

The projected harbours and other landing facilities should therefore be as outlined below.

One harbour in the Capital area, capable of accommodating 10 vessels at least 25 metres long, and 100 multipurpose vessels (9 m workboats and 15 m multipurpose boats). The volume of fish to be handled would be in the order of 70,000 mt/year. Estimated investment cost R.O. 8 million.

One harbour in the area of Sur capable of accommodating 30 vessels at least 25 metres long, and 200 multipurpose vessels. The annual volume of fish to be handled is estimated at 120,000 mt. The estimated investment cost is R.O. 11 million.

One harbour in the Duqm area, capable of accommodating 10 vessels at least 25 metres long, and 200 multipurpose boats. The annual volume of landings is estimated at 70,000 mt. Projected investment cost: R.O. 8 million.

One harbour in the Raysut area, capable of accommodating 20 vessels, at least 25 m long, and 200 multipurpose boats. The annual volume of landings is estimated at 70,000 mt. Projected investment cost: R.O. 3 million, as this will be built within the sheltered area of the present commercial harbour.

Five smaller harbours, located in the general areas of North Batinah, Quriyat, Al Ashkara, Hasik, and Sudah, each capable of accommodating 150 - 250 multipurpose boats (respectively 9 m & 15 m long), and annual landings of some 20,000 mt. Estimated cost of construction is R.O. 3 million per harbour, or a total of R.O. 15 million. The smaller harbours may have different capacities, depending on the construction of haul-out (launch/haul) facilities.

The skiffs will continue landing on the beaches. A significant portion of those boats are being used, and will remain to be used, by part-time fishermen. However, the Government needs to develop haul-out mechanisms which will ease the hard work of beaching and launching small boats.

The harbour projections given above provide for a slightly larger number of boats, and higher volume of fish than actually shown in the production section. This is due to the fact that harbours should have a limited spare capacity to accommodate increases which cannot be foreseen at the stage of long-term planning. A summary of harbour projections is given in Table 14.

The total investment in fishing harbours is estimated to be R.O. 50 million over the period of 20 years. The construction of harbours should start during the 1991-1996 Five Year Plan period, to provide the indispensable infrastructure for projected catch increases, and the meat to produce them. For the purpose of this plan two-thirds of the investment (R.O. 30 million) cost has been included in the 1991-1996 period, and the remainder during the subsequent five year plan.

4.5 UTILIZATION OF CATCH AND MARKETING

The present national demand for fish is considered to be fairly well met by present landings. According to FAO estimates the consumption per capita in 1979/81 was around 20kg/year, and it is most likely higher today as a result of increased landings, and a better distribution system. The domestic market for fish is concentrated in towns and fishing villages. Fish landed is often sold by auctioneers to truckers who take it inland. Several other middlemen may be involved before the fish reaches the consumer. Some fishermen continue to market their own catch. Limited potential for expansion exists in isolated areas, where fish is still not easily available. A modest increase in national per capita fish consumption, of some 20% over the plan period, is also anticipated as a result of the population becoming more diet conscious and a fish consumption promotion programme.

The bulk of the incremental catch will, therefore, have to be exported. The key to exporting fish is its species and quality. The new industrial fleet is expected to introduce proper fish handling and preservation practices from the beginning. This will require adequate shoreside facilities, i.e. processing, cold stores, ice, proper transport. The assurance of good fish requires Government assistance -- through an appropriate extension programme.

A consumer education programme may also be of relevance. Once the consumers start demanding good quality fish, being prepared to pay a premium for it, the fishermen as well as the middlemen, will have to improve the fish handling practices in order to increase their earnings.

The main problem anticipated at the planning stage is the utilization of small pelagic species, primarily sardine. As small pelagic species account for the bulk of the incremental catch: 192,500 mt or 88% of the total catch increase, the problem of their utilization and marketing is of paramount importance. These are species of a relatively low market value, and there are only few international markets capable of absorbing the volume discussed. Development of a processing industry (canning, salting, drying) will have to be left to the private sector. The private sector also has already indicated its interest in fishmeal production on limited scale. Those efforts should be encouraged and facilitated, but carefully evaluated, as they are the key to absorption of projected landings.

Oman is a major supplier of fish to the neighboring countries in the Arabian Peninsula. Although in principle Omani fish is highly appreciated, problems resulting from poor quality have started to adversely affect the trade. The advantage of Oman in exporting fish to the neighboring countries is considerable, provided the fish is of top quality and supplies are regular and consistent. There are species of fish in Oman which fetch high prices in international markets (USA, Europe, Far East) provided the quality is high. Tunas and some demersal species (groupers, snappers, breams) constitute the obvious potential for exports. The crucial factor is the quality of fish. Quality assurance starts at sea, the moment the fish is hauled on board ship. Icing and proper handling are the principal elements to be introduced to the traditional fishery.

4.6 OTHER FACILITIES

This group of facilities is expected to be provided by the private sector. They are briefly outlined here, because the private sector may be seeking loans for their construction, and because allocations of space will have to be earmarked at key landing centres/harbours. The outline contains only facilities to be provided during the timeframe of the plan, in addition to those which are being commissioned at the present time.

	R.O. million	
	Short term (1990-1995)	Medium term (1996-2000)
Processing plants/buildings		
Ice plant 100 tons/day	1.25	0.6
Ice plant 40 tons/day	0.3	
5 Ice plants @ 10 tons/day		0.125
Ice store 300 tons	0.25	
Ice store 120 tons	0.04	
5 Ice stores @ 30 tons		0.025
Blast freezers	0.075	
Plate freezers	0.25	0.15
Wet fish store 300 tons	0.1	0.1
Wet fish store 200 tons	0.05	
5 wet fish stores of 20 tons		0.04
Cold stores - 1000 tons	0.05	
Cold stores - 1000 tons	0.5	0.5
Fishmeal plant, 150t/day (?)	0.5	
Fishmeal plant, 250t/day (?)	3.0	
2 fishmeal plants of 50 t/day	4.0	
		0.2
Sub-total	10.365	3.540
<u>Transport facilities</u>		
Pick-up truck with fish boxes	0.7	0.1
7 ton reefer trucks	0.7	0.1
10 ton refrigerated trucks	0.1	0.1
20 ton reefer trailer	0.15	0.09
20 ton refrigerated trailer	0.28	
20 ton regular trailer	0.075	0.175
Collection boats	0.08	0.04
Insulated boxes	1.5	1.0
Sub-total	3.585	1.605

Drydock and marine rail

The drydock should be located in one of the four major fishing ports to be constructed. Its facilities may be shared with other potential users such as ROP and SON. The investment, if required, should be made out of Government funds; the cost should be shared with future users.

Drydock	5.0	
Marine rail	2.0	2.0
	-----	-----
Sub-total	7.0	2.0
	-----	-----
Grand total	20.950	7.145
	-----	-----

The inclusion of fishmeal plants under the private sector investment is meant to indicate one of the possibilities of utilizing the landings of small pelagic fishes. Further detailed studies of the potential for utilization of small pelagic species for direct human consumption, domestically or for exports, will have to be carried out.

4.7 INSTITUTIONAL FRAMEWORK

The Directorate General of Fisheries has a statutory responsibility for the overall administration of the fisheries sector and implementation of the Government's plans and policies in this respect. Within the framework of this long-term fisheries development plan two particular functions of the DGF require particular emphasis: (i) management of the fishery resources, and (ii) extension services. Furthermore, the legal framework for the management of resources needs to be set in detail.

1. MARINE RESOURCE MANAGEMENT

A continually updated understanding of resource potential is essential to careful management of a fishery. At present, knowledge of the resource is limited but sufficient for careful development. The Second and Third Five Year Plans have addressed this constraint by initiating resource assessment programmes and a fisheries statistics system. With continued support these programmes will provide a good basis for fishery planning.

The management of resources includes the following:

- (a) information collection (research studies, statistical data, resources surveys, etc.);
- (b) analysis of that information (stock assessment, knowledge of species biology, formulation of management plans, etc.);
- (c) management actions aimed at rational exploitation of the resources at sustainable levels, i.e. oriented toward the increased development of the fishery or restrictions on the fishery.

The above listing includes a number of activities which can be executed only by the specialized unit of the Directorate General of Fisheries, i.e. the Marine Science and Fisheries Centre. The Marine Science and Fisheries Centre, by definition, should provide the DGF with the basis for formulation of management plans and management actions; however the MSFC in order to be able to work out such a basis for management plans and actions needs information which should be routinely collected by other units of the DGF. A very close cooperation and coordination between the DGF's administrative units, and its research arm - the MSFC - are therefore indispensable to achieve the resources management objectives.

The respective roles of the DGF and the MSFC, contained in their respective mandates, may be defined as follows:

The Marine Science and Fisheries Centre in close cooperation with the DGF has the primary responsibility for research studies, resources surveys, analysis of that information, and providing the DGF with the basis for sound management plans. It should also advise the DGF on management actions deemed most appropriate under given conditions.

The administrative units of the Directorate General of Fisheries are directly responsible for development of fishery resources management plans and taking management and enforcement actions. The DGF's administrative units have to provide the MSFC with statistical information within established programmes for collection of fishery statistics for stock assessment purposes. Resource management plans should be developed in close consultation with the MSFC.

At the present moment the permanent staff of the Directorate General of Fisheries does not have the capability to develop management plans and to implement them. The key factor in this respect is the availability of adequately qualified professional staff, who could make use of the information the MSFC is ready to provide, and prepare plans for approval by the respective authorities, as well as execute such approved plans. It cannot be overemphasized that management of marine fishery resources is a continuing exercise, as is resources assessment work. A survey programme provides only the starting point for long-term continuing stock assessment work, and may verify its results. The very nature of living marine resources, subject to changes in environment and fishing pressures both within and outside the EEZ, requires continuous monitoring and research work, as well as up-dating of management actions.

In the absence of readily available professional staff a training programme must be established to prepare personnel for this task. Both the research and administrative staffs require significant upgrading. The staff should be trained specifically in fisheries management and development, to be equipped properly to deal with the complex problems of the national fisheries. Training may be organized on-the-job, with the assistance of expatriate staff at the DGF (as long as such staff is employed) and the MSFC, but external training at reputable universities should be undertaken simultaneously.

It is essential that actions to create and develop the research and resources management capability in the Directorate General of Fisheries start immediately, if possible during the Five Year Plan 1986 - 1990, but at the latest at the beginning of the next Five Year Plan (1991-1995).

4.7.2 Extension Services

It is essential for the development of the fishery to provide the traditional fishermen with knowledge of new fishing vessels, gear, as well as techniques of fish handling and preservation. The scattering of fishing villages along the coast of the Sultanate makes it difficult to establish and operate a development centre, where fishermen could get the extension information, and possibly training.

It is for this reason, that a strong, well organized and well staffed extension service must be further developed in the Directorate General of Fisheries, with the task of serving all traditional fishermen. As time goes on and more qualified national personnel are available, fisheries extension officers should be assigned to major fisheries areas. The Extension Service should be well equipped to demonstrate to the fishermen that new vessels and techniques will provide the means to make the individual operations more efficient both in terms of monetary value and make working at sea easier.

The Extension Service should be equipped with two types of vessels recommended for introduction to the traditional fishery, which would travel from one major fishing centre to another to demonstrate operations of the vessels. Fishermen who wish to go to sea with the extension crew for a limited period of time should have the opportunity to do so. Various types of fishing gear recommended for introduction (or improved existing types of gear), should be the regular equipment of the vessels. Audio-visual equipment and other extension aids should be available as a matter of course. In view of the low level of literacy among traditional fishermen, extension techniques and materials other than written will have to be used for several years to come. With the improvement in literacy rates written extension materials, it is expected, will be of increasing value.

In view of the complexity and urgency of the extension service tasks it is recommended that strengthening of the existing extension unit of the DGF start immediately, so that by the year 1991 - the first year of this long term plan, the extension service is in place and fully operational. Training of extension workers is a long term endeavour and this emphasizes the urgency of actions.

It is estimated that five vessels will be required for the extension service at a cost of approximately R.O. 350,000. Three boats should be some 10 m long, and the other two approximately 18 m long. Both types should have the capability of demonstrating several fishing techniques, to be introduced to the traditional fishery.

Their annual operations cost (fuel, maintenance, crew, gear, insurance) is estimated at R.O. 150,000.

The acquisition of the vessels is scheduled for the period 1991-1996, however preparatory work (determination of type of vessels, their design-if necessary, negotiations with designers/builders) should start in 1989.

4.7.3 Legal Framework

The Sultanate has promulgated a basic fishery law providing for control of exploitation of the marine resources within Oman's EEZ. To allow the Directorate General of Fisheries perform its management function in a proper manner, once the resources management plan and actions have been determined, will require that detailed rules and regulations are determined in areas such as: licensing; reporting of statistical information; stock management; enforcement functions; designation of "authorized officers" for inspection purposes and enforcement of the regulations in general; resolution of conflicts.

The detailed rules and regulations should be developed without delay, prior to the commencement of implementation of this long-term plan. Current developments in the commercial sector would already be facilitated if such rules and regulations existed.

Of paramount importance is the clarification of enforcement authority within the DGF. It should be clarified if, at present, DGF officials have the authority to arrest fishermen violating existing regulations, or seize vessels. Their future authority should be defined in detail.

4.8 TRAINING NEEDS

A well planned and coordinated development of any economic sector, and fisheries is no exception, depends more on the availability of properly trained and skilled manpower than on any other input to be provided. Vessels, harbours, shoreside facilities (processing, cold storage), may be introduced once funding is available and a decision made to acquire them. Operation of all those means of production, however, requires skilled manpower, without which the facilities will not produce the expected results. The above states the obvious; however, it is the crucial problem facing the fisheries of Oman.

Training is required at all levels:

- fisheries administrators (in a number of specialized fields) for the DGF;
- fisheries scientists for the MSFC;
- fisheries extension workers;
- fishermen, and especially officers, for industrial fishing vessels;
- fishermen for the traditional fishery;
- plant managers, fish processors, maintenance personnel.

Vocational training of young people, to prepare them to take the jobs of their fathers and operate modern equipment, has to be seen as an essential element of upgrading the social status of the occupation. It is also a key element in retaining the younger generations in the fisheries sector rather than encouraging them to drift to urban centres, where there seems to be more attractive job opportunities.

An indication of trained manpower requirements by sector is given below as indicative figures for the specified periods:

1991-1995 1996-2000 2001-2010 Total Program

Fishing Sector

Skiff Fishermen	2000	2000	4000	8000
9 m Boat Fishermen	500	500	500	1500
15 m Boat Fishermen	200	400	400	1000
Lg. Vessel Officers	50	100	150	300
Vessel Engineers	50	100	150	300
	2800	3100	5200	11,100

Extension
 Mobile Training Sch.
 Fisheries Training Inst.
 Fisheries Training Inst.
 Fisheries Training Inst.

Processing Sector

Administration	50	100	75	225
Plant & Product.	600	600	600	1800
	650	700	675	2025

-
 On - The - Job

Transport & Marketing

Transport/wholesale	500	600	-	1100
Retailing	500	500	-	1000
	1000	1100		2100

Government

Research	10	10	10	30
Administration	10	10	10	30
Inspection/Enforcement	20	10	10	40
Extension	15	10	10	35
	55	40	40	135

University
 University
 Fisheries Training Inst.
 Fisheries Training Inst.

 TOTAL 4505 4940 5915 15,360

It should be pointed out, that the above figures represent the approximate final demand for skilled manpower. The number of persons entering the training process has to be larger due to drop-outs and personal changes in chosen careers.

It is recommended that a detailed long-term plan for meeting qualified manpower requirements be developed. The programme should be developed as soon as possible, preferably in 1989/1990; it should be considered a preparatory step towards the implementation of the long-term fisheries development plan. The estimated cost is R.O. 30,000.

Training of fisheries administrators and extension workers, as already emphasized, should be both on-the-job and institutionalized at universities or other appropriate institutions. Details of the number of personnel to be trained by specialization, type of training, training institution etc. should be included in the manpower development programme. The needs for new entrants into various jobs as well as replacements for positions occupied at present should be identified.

Training of officers (including captains/skippers) for modern offshore fishing vessels requires a great many years. Training at school has to be complemented by practical work at sea in lower ranking positions, which then constitutes the basis for gradual promotion to positions in command of a vessel and its entire operation. Fishing, especially in waters frequented by international ships (cargo or fishing), and this applies to the EEZ, requires that officers hold certificates recognized internationally. The complex and long lasting task of training officers should commence as early as possible.

The training should be carried out at a well appointed fishermen's school. Considering the needs of the industry, identified at this stage in general terms, it is recommended that a fisheries training school be established in Oman, and its creation has been scheduled for the period 1991-1995. Preparatory work, however, should start in 1989, and it would include:

- detailed planning for the school;
- choice of site;
- design work, preparation of tender documents;
- selection of contractors, identification of teaching staff, preliminary preparation of programmes, curricula, determination of equipment needs.

A training institution of the type recommended should have its own training vessel. In view of the fact that a considerable amount of preparatory work still needs to be done, the following plan of action is proposed for consideration:

- (i) use of the vessels recommended for the extension service, on a time sharing basis during the early stages of the school's operations;
- (ii) acquisition of a vessel exclusively for the school in 1993.

A preliminary budgetary provision is being made in this plan to earmark funds which may be needed if it is decided to purchase a specialized training vessel.

The creation of the school entails both the investment in physical facilities, i.e. classrooms, laboratories, dormitories, recreational facilities etc. and the development of curricula, training of teachers and instructors. Schools of the type recommended exist elsewhere in the world, and assistance of specialists may be sought to develop a rational programme for its creation in Oman, and start its operations.

The estimated costs of the training centre are as follows:

- construction of the school facilities	R.O. 500,000
- equipment (including electronics, simulator etc.)	R.O. 500,000
- training vessel - investment	<u>R.O. 400,000</u>
Sub - total investment 1991-1995	R.O. 1,400,000
- annual operations costs	R.O. 1,000,000

.9 SUPPORT PROGRAMMES

The upgrading of the status of fishermen will require, among other actions referred to in this document, that a public education campaign be undertaken. Its objective would be to explain to the population of the country the nature of the fisherman's work, its importance to the national economy in harvesting the wealth of the ocean, its importance as supplier of healthy food, modernization of the sector and its projected future role. Such a campaign should also be beneficial to attract new entrants into the occupation.

Projected cost is R.O. 1 million, during the period 1991 - 1995.

Another programme of support to fisheries would entail the promotion of fish consumption. A programme of this nature has wide ramifications, as it would contribute to the improvement in nutrition standards, marketing of fish, and even upgrading the status of fishermen.

Projected cost is R.O. 0.3 million during the period 1996 - 2000.

5. ECONOMIC ANALYSIS - JUSTIFICATION

5.1 PLACE OF FISHERIES IN THE NATIONAL ECONOMY

As has been stated in the preceding sections, the fisheries of Oman are at a crossroads. It is appropriate then, to briefly analyze the place fisheries occupies in the national economy, and the Government investment in the sector, compared to the absolute growth of fisheries.

Table 15 gives the contributions of individual sectors to the national economy of Oman in 1976, 1981 and 1986. The lions share of the total GDP is contributed by mining and quarrying (59% in 1976; 60% in 1981; and, 36% in 1986), industries based on finite and non-renewable resources, principally oil. It is for this reason that the fisheries contribution to GDP has been expressed as a percentage of total GDP minus that portion which has been contributed by mining and quarrying. In this context, in 1986 fishing has contributed 1.4% to the GDP at current prices. For comparison, the public utilities, a priority sector in Oman (electricity, gas & water) have contributed 2.3%. The relative share of fisheries contribution to GDP has declined since 1976 (1.7%), however in absolute terms the value of production has grown four-fold: from R.O. 6 million in 1976 to R.O. 25.5 million in 1986. The 1987 value of fisheries production grew to R.O. 32.5 million at ex-vessel prices, of which R.O. 30 million have been contributed by the traditional sector.

An analysis of sectoral distribution of Government investment (Table 16) -- in comparable terms, i.e. after elimination of investment in the oil industry -- shows, that over the period of ten years (1977-1986) the fisheries sector received a modest 0.5% of the Government investment, primarily in cold stores and distribution facilities. This figure is, however, biased by the increased investment in fisheries in 1985 and 1986 which, although higher than during the earlier years, was only 0.9% of the total. The average Government investment in fisheries over the period 1977-1984 was only 0.4% of the national total.

The six-fold growth in the value of fisheries production between 1976 and 1987, with the modest investment in the sector made by the Government, developed vigorously, but in a spontaneous manner. The fishing activities, fully controlled by the fishermen, have grown to the limit allowed by existing infrastructure, in terms of landing of the catch and marketing. This growth is partly attributable to the Fishermen Encouragement Fund instituted by the Government, and partly to the emergence of numerous small entrepreneurs who have developed a grass-roots fish transportation and distribution system throughout the entire region. The latter was possible thanks to the developing network of roads. In the last two years, significant growth in use of infrastructure (primarily cold stores) has occurred--and the estimated 1988 landings have increased concomitantly. However, cold store capacity is still far short of what is required, and harbours are sorely lacking. Water, power, and roads are inadequate in areas adjacent to the richest fish resources.

From an investment perspective the lack of infrastructure has now

¹⁵
TABLE 15. GROSS DOMESTIC PRODUCT BY SECTOR AT CURRENT PRICES, 1976-1986
 Million Rial Omani

S E C T O R	1976		1981		1986	
	Amount	%	Amount	%	Amount	%
Agriculture & Livestock Production	12.3	3.4%	40.5	4.0%	63.8	3.6%
Fishing	6.0	1.7%	21.6	2.2%	25.5	1.4%
Manufacturing	4.3	1.2%	27.0	2.7%	178.3	10.1%
Electricity, Gas & Water	6.4	1.8%	18.7	1.9%	40.3	2.3%
Construction	88.5	24.4%	144.9	14.4%	228.8	12.5%
Wholesale, Retail Trade, Restaurants and Hotels	76.5	21.1%	251.3	25.1%	383.2	21.7%
Transport, Storage & Communications	13.9	3.7%	53.8	5.4%	102.2	5.8%
Financing, Insurance, Real Estate & Business Services	92.0	25.4%	206.6	20.6%	286.3	16.2%
Community & Personal Services	4.4	1.2%	16.9	1.7%	38.5	2.2%
Producers of Government Services	69.3	19.1%	260.5	26.0%	495.8	28.1%
Less: Imputed Bank Service Charges	-10.9	-3.0%	-39.0	-3.9%	-71.2	-4.0%
Sub - total	362.3	100.0%	1002.8	100.0%	1763.5	100.0%
Mining & Quarrying	517.5		1476.4		997.2	
TOTAL - GDP AT PRODUCERS' VALUES	879.8		2479.2		2760.7	

Source: Sultanate of Oman, Statistical Year Book, Fifteenth Issue, November 1987;
 Development Council, Technical Secretariat, Directorate General of National
 Statistics, Table 237.

TABLE 16. DISTRIBUTION OF GOVERNMENT INVESTMENT DURING 1977-1986
RELATIVE SHARE OF FISHERIES

	1977-1986	1977-1984	1985-1986
TOTAL GOVERNMENT INVESTMENT	4334.3	2980.7	1353.6
INVESTMENT IN THE OIL INDUSTRY	811.7	552.1	259.6
INVESTMENT: TOTAL - OIL	3522.6	2428.6	1094.0
GVT. INVESTMENT IN FISHERIES	19.1	9.7	9.4
% FISHERIES TO TOTAL - OIL	0.5%	0.4%	0.9%

SOURCE: SULTANATE OF OMAN, STATISTICAL YEAR BOOK, FIFTEENTH ISSUE, NOVEMBER 1987, DEVELOPMENT COUNCIL, TECHNICAL SECRETARIAT, DIRECTORATE GENERAL OF NATIONAL STATISTICS. TABLE 232.

become a constraint to further significant growth of the sector. Possibilities of increasing catch, within limits of sustainable exploitation, exist through expanding fishing operations. Those, in turn, require investment in more modern boats and gear and further encouragement extended to fishermen to take this path of development. Harbours, large and small, are indispensable for the present, and even more so for the future fleet of fishing vessels.

It is in the above context that the economics of this indicative long-term fisheries development plan have to be analyzed.

5.2 ECONOMIC RETURNS ON THE PLANNED INVESTMENT

The economic analysis of investment and projected returns in a plan of this nature has to be based on joint investment by the Government and the private sector. Private entrepreneurs, before investing in fishing vessels or shoreside facilities, will carry out their own business analyses, including return on investment. The point is however, that no businessman would be prepared to invest in modern fishing vessels unless harbours and other elements of the essential infrastructure (roads, electricity, water etc.) are in place, and there is a fleet capable of delivering the raw material i.e. fish. Fishing harbours have to be provided, and it is the Government's responsibility to construct them -- in a planned manner -- and make them available to the fishing fleet operators. The investment in harbours and other infrastructure facilities for the fishing industry has to be seen as an integral component of the overall long term fisheries development in Oman. It is unlikely that the investment in harbours, training facilities and support services could be economically feasible in itself. It is for this reason, that the investment by the Government and the private sector has been compared to the monetary benefits accruent to the national economy as a result of the joint investment. While the private sector investors will work out their detailed feasibility studies to determine the type of boats or shoreside facilities they would like to acquire, the overall analysis from a national economy standpoint proves that prospects for profitable investment are good. This should encourage the private sector to start considering investment in fisheries, and the Government to actively promote such trend.

The projected Government investment in harbours, fisheries school, extension services and support programme totals R.O. 57.1 million over a period of fifteen years (Table 17). The provision of infrastructure has to precede a substantial growth in fishing and thus it has been scheduled primarily for the first ten years of the plan, when the bulk of the total Government investment programme should be implemented.

The projected private sectors investment totals R.O. 100 million over the entire plan period. Almost R.O. 81 million are estimated for investment in fishing vessels, and the remaining R.O. 19 million in shoreside facilities and transport.

The net present value of fish landings, discounted at a rate of 10% over the economic life of the vessels to be introduced, is R.O. 212.0 million. The present value index is 1.36. The index expresses the ratio between the discounted value of future net cash flows (value

TABLE 17. SUMMARY OF INVESTMENT 1991-2010

R.O. million

	1991 to 1995	1996 to 2000	2001 to 2005	2006 to 2010	Total
1. GOVERNMENT INVESTMENT					
1.1 Harbours - Table 14	25.00	20.0			45.0
1.2 5 vessels for extension service	0.35				0.4
1.3 Drydock and marine rail		7.0	2.0		9.0
1.4 Fisheries school	1.00				1.0
1.5 Fisheries training vessel	0.40				0.4
1.6 Support programmes					
- Public education	1.00				1.0
- Promotion of fish consumption		0.3			0.3
Sub - total: Government investment	27.75	27.3	2.0	0.0	57.1
2. PRIVATE SECTOR INVESTMENT					
2.1 Traditional fishery - vessels	38.00	11.7	8.6	6.0	64.3
2.2 Industrial vessels (Table 13)	4.40	3.4	4.4	4.4	16.6
2.3 Shoreside facilities	10.37	3.5			13.9
2.4 Transport	3.59	1.6			5.2
2.5 Sub-total: Private sector investment	56.35	20.3	13.0	10.4	100.0
Investment - Total	84.10	47.6	15.0	10.4	157.0
3. Value of fish landed - end of period at 1988 ex-vessel prices					
	71.70	84.6	97.7	107.2	x
4. Net present value of increments in catch over the economically useful life of vessels @ 10% discount rate.					
					212.9
5. Present value index					
					1.36

of landings minus cost of production without depreciation) and the investment expressed in absolute terms, at projected cost. This level of return on such a complex development programme should be considered satisfactory, especially in view of the simplified manner in which the calculation has been made, i.e. without including economic benefits accruing to the national economy from fish trade, spin-off effects (multiplier effect) of the industry etc..

The absolute value of fish landings in 2010, at 1987 ex-vessel prices, is R.O. 107 million which compared to the 1987 value of fish landings of R.O. 32.5 million constitutes an increase of 3.3 times. It is estimated that the retail value of the fish will be some R.O. 250 million.

The multiplier effect factor may be assumed as at least 3, thus the stimulus to the national economy is very high.

5.3 SOCIAL IMPACT : NON-QUANTIFIABLE BENEFITS

Improved income, living standards, and status of the fishermen. The plan is aiming at traditional fishermen, as a specific target group, whose incomes and living standards need upgrading. The implementation of all the components of the plan will result in attaining this particular national policy objective.

Improved nutritional standards will be facilitated through an increased availability of fish and fish products. Seafood promotion will constitute an additional boost to higher fish consumption and thus better nutritional standards.

Increased foreign currency earnings through exports of fish.

Further employment prospects for the citizens of Oman. One of the most important aims of the plan is to retain the fishermen and their sons/successors in the rural areas, and prevent undesired migration to urban centres. Upgrading of the boats and gear, improvement of incomes, are the major aspects of the plan which should help achieve this objective.

Economic investment projects for the use of national sources of capital are the substance of the plan. This applies to investment in boats, whether traditional or industrial, as well as in shoreside facilities. Creation by the Government, through its fisheries administration, of a favourable business climate, as a component of the overall plan will further enhance the attainment of the national objective.

6.0 IMPLEMENTATION

Published accounts of a number of countries which have recently developed their national fisheries indicate that a long term plan is only the first small step towards development of an entire sector of the national economy. The implementation of the plan, both with

regard to investment by Government and the private sector, as well as the role Governments have to play to facilitate and stimulate development, is a most difficult and arduous task. Timely provision of infrastructure facilities, and adequate support given the private sector are key elements to success.

It is natural that the past development priorities of Oman required the major financial and institutional effort to be put into strategic sectors (such as petroleum, electricity, roads) which are the foundation of further economic development. The lower priority given fisheries development is therefore explained. It should be emphasized, however, that fishery resources are renewable, and if properly managed may sustain a rational exploitation indefinitely. This is the key reason for which fisheries development should now receive priority. Development of fisheries will make a substantial contribution to the diversification of national economy with a lasting impact.