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MANPOWER TRAINING NEEDS ASSESSMENT

FOR

THE SULTANATE OF OMAN  
FISHERY SECTOR

Produced for

The Omani-American Joint Commission



Written by

Michael T. Morrissey and George Aelion

With Direction from

Spiros M. Constantinides

December 30, 1968



International Center for Marine Resource Development: ICMRD  
The University of Rhode Island  
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Kingston, RI 02881-0804 USA



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### Acronyms

ALIGU	American Language Institute at Georgetown University
COP	Chief of Party
DGF	Directorate General of Fisheries
FDP	Fisheries Development Project
FTC	Fisheries Training Center
GRE	Graduate Record Exam
HCN	Host Country National
ICMRD	International Center for Marine Resource Development
IMF	International Monetary Fund
MAF	Ministry of Agriculture and Fisheries
M.M.A.	Master of Marine Affairs
MSFC	Marine Science and Fisheries Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Agency
OAJC	Omani-American Joint Commission
ONFC	Oman National Fishing Company
OTIC	Oman Technical and Industrial College
RA	Research Assistant
R.O.	Rial Omani
OSU	Oregon State University
RDA	Research Development Associates International, Inc.
ROP	Royal Oman Police
SAT	Scholastic Aptitude Test

SQU	Sultan Qaboos University
TA	Technical Assistant
TC	Training Coordinator
TNAG	Training Needs Assessment Guide
TOEFL	Teaching of English as a Foreign Language
UNDP	United Nations Development Program
URI	The University of Rhode Island
USDA	U.S. Department of Agriculture
USG	United States Government
USIS	United States Information Service



## I. Executive Summary

Oman's 1,700 kilometer coastline supports a vibrant and healthy traditional fishery. Small scale fishermen have adroitly adapted their vessels and gear to the local environment and have received additional support from a subsidized loan program offered by the Directorate General of Fisheries.

The sector in its present form has attained a production plateau well below the maximum sustainable yield of the resource. The challenge remains to increase the yield without disrupting or displacing the traditional sector nor its valuable economic contribution. The pressure for development of the fishery is threefold (1) The government realizes that the sector represents a renewable and sustainable resource that has not yet reached its potential. (2) The sector provides an avenue to increase the employment base of the burgeoning high school graduate, and degree level population. (3) The primary source of foreign exchange revenues (oil) is not a renewable resource and will eventually diminish in value.

The Omani/American Joint Commission has decided to concentrate its resources on the fishery sector, an area with a long history of participation in the economy of Oman. The challenge remains to translate the existing energy of the sector into a self-sustaining, efficiently managed and more productive entity. One way of channeling the inherent interest in fisheries into a more modern sector is to provide a comprehensive training package for all members of the industry (fishermen, Ministry officials, researchers, members of supporting institutions (Sultan Qaboos University, Oman Technical and Industrial College), and members of the private sector). This report attempts to quantify and prioritize the levels of training required to develop a viable and sustainable industrial fisheries sensitive of the constraints inherent in the system and to the individuals already in that system.

The Government of Oman is expanding its commitment to the development of a modern fishery as evidenced by the creation of a Fishery Department within the Sultan Qaboos University. The expansion of educational opportunities within the country will directly impact on the number of people entering the sector. The lower spectrum of the educational system (primary and secondary) has witnessed dramatic gains in the number of attending students. The Oman Technical and Industrial College and Sultan Qaboos University are in their infancy and still depend heavily on outside experts for

technical support. The institution-building needs at the University, College and DGF will continue beyond the eight year life of the project, but the dependency can be lessened through a concerted training effort that covers the spectrum of training requirements that will eventually result in a more coordinated approach to development of the government, research, academic and private sectors.

The introduction of a cadre of trained experts will result in an in-house capability to respond to policy decisions related to fisheries management, common property resource utilization and natural resources conservation use. The training will address the technical needs of fisheries science as well as increase the understanding of basic biological principles. This assistance aimed at the research and university sectors will be coordinated with training in standard methods of organizational management and administration at the Directorate General of Fisheries. The enhancement of capabilities through the entire fishery sector is intended to lead to a coordinated approach to development that works in tandem with the private sector. The goal of a well designed and comprehensive program is to enhance the organizational capabilities of the Ministry through strengthening the capabilities of the Marine Fisheries and Science Center and the Fisheries Department of Sultan Qaboos University.

The professional training at the graduate degree level will necessarily be conducted out of Oman, as no graduate program presently exists. The eight year time frame of this project will not produce the number of graduates for complete Omanization of the sector but will make a major impact towards that goal. Initially, components of the technical training may have to be conducted in the U.S. or in third countries, but the objective of the project should remain to build that capability within Oman by demonstrating a commitment to the process of institution building.

Training must not occur in a vacuum but must serve the function of making the industry self-sustaining as well as providing the institutional capacity to continue the educational process. The technology will not remain static after the life of the project so it is important to train a cadre of individuals who are capable of digesting and filtering appropriate new technologies for the government, research, academic and private sectors.

The information required for this report was collected from a number of different sources and cross-referenced through interviews with key informants from the government,

research, academic and private sectors. The Training Needs Assessment Guide, a USAID publication, served to set the structural parameters for the collection of data and the subsequent analysis and results. The results allowed for the extrapolation of the implementation plan and the recommendations.

Based on an analysis of the training needs and the available resource pool, an eight year training effort by The Omani/American Joint Commission should provide training for the following personnel:

- a) eight Ph.D. candidates
- b) thirty three Masters Degree candidates
- c) fifteen Bachelors Degree candidates in the U.S.
- d) seventy- four B.S. level candidates to be educated at Sultan Qaboos University.
- e) sixty individuals with two years of technical training in the U.S. and third country.
- f) Seventy-seven individuals to be trained at Oman Technical and Industrial College
- g) in-country skill training to two hundred and twenty members of the DGF and private sector.
- h) Study Tours for eight DGF Directors.

Technical support to accelerate the Omanization of the fishery sector includes institutional building assistance to:

- a) Sultan Qaboos University for years one and two through the hire of two visiting professors for each year
- b) The Oman Technical and Industrial College through a consultancy to assist in the creation of a Fisheries Science and Technology Department.

If the department at OTIC becomes operational, two visiting professors should be hired by the Joint Commission to bolster the newly appointed staff for the first two years of operation.

Technical Assistants should be incorporated into the efforts of the training component by involvement with course instruction at the University and at OTIC as well as with the development of skill training workshops.

The training scope encompasses a wide array of identified needs, and the challenge remains to secure a self-sustaining sector at the management, production, post harvest processing and marketing, and research levels.

## II. Introduction

One of the major constraints to fisheries development in Oman is the current lack of trained manpower in the sector. This is understandable in light of the fact that formal education at the primary and secondary level began in the early 1970's. It is only over the last several years that there have been a significant number of graduates from the secondary level. A small percentage of these have continued their education and training abroad in specific disciplines. However, the numbers remain small and there is an urgency to accelerate the training program in several economic sectors of the country, including fisheries. The training needs in fisheries are great and the project with its emphasis on training will aid significantly in meeting the country's goals for the fisheries sector.

The purpose of this consultancy was to conduct an assessment which would: (1) identify the human resource requirements of the sector, including the fisheries private sector, the Fisheries Department at Sultan Qaboos University (SQU), and the Directorate General of Fisheries (DGF); and (2) propose suitable methods, arrangements, and time schedules for implementation of this component of the project.

Training can be defined in various ways. In the Fisheries Development Project sponsored by the OAJC it would be instructive to divide training into the following categories:

Degree training - This is defined as training at the two year Technical College, B.S./B.A., M.S./M.M.A., and Ph.D. levels. Graduate degree training is recommended for U.S. universities as no programs in fisheries at the graduate level exist in Oman.

Skills training - This training is defined as non-degree training to improve specific skills. This is further subdivided into training by short-term intensive courses and day release programs.

Extension training - This training is directed to the traditional fishermen and is undertaken in or near fishing communities. These programs should be taught by the proper government agency.

Study tours - These tours are directed to high level administrators in the government sector. They will help demonstrate different fishery related operations as performed in the U.S. and third countries.

## A. Country Goals

Several reports have been published since 1987 stating the country goals for fisheries development in Oman. These goals are discussed in more detail in the section on Technical Assistance (prepared by R. Neal) in a separate report. Although stated in different ways they fall into these broad categories.

- 1) Diversification of the economy.
- 2) Proper management of the resource.
- 3) Improved standard of living of the traditional Fishermen.
- 4) Continued development of the infrastructure.
- 5) Improved quality of fishery products.

In order to realistically achieve these goals, serious training efforts have to be undertaken to provide personnel trained in fisheries for the government, research, education and private sectors. For fisheries this would include the training of personnel at the technical as well as the degree and advanced degree levels. It would also include extension training for the traditional fishermen as they are the principal parties involved in production. The following explains the interrelationship of the country's goals and training with the various components of the fisheries sector.

### 1. Government

The government sector includes the DGF, MSFC, National Agriculture and Fisheries Bank and an enforcement component. Since the MSFC is mainly involved in research, that particular component will be discussed in a separate section. There are immediate training needs in all government departments in fisheries. The training of upper level personnel in administration and as fishery resource managers will enable them to design and run fishery programs important for Oman. The training of technicians and research assistants will provide needed personnel for data collection, analysis and management of the resource. Properly trained extension agents are needed to instruct traditional fishermen in new fishing skills. The banking sector needs training for their regional program officers so that there is a better understanding of the economics of fisheries operations from the traditional as well as the industrialized standpoint. The training of fisheries enforcement officers is also needed for proper management of the resource.

## 2. Research

Research needs are currently being met at the MSFC by a fisheries development project and senior scientists sponsored by the OAJC. Their main objective is to establish and implement research programs that will allow the DGF to properly manage and develop the resource. Eventually their positions will be filled by Omanis who have received their advanced degrees in specific areas. This will be a gradual process and will occur over the next decade. Because of the time-frame it is imperative that degree training begin as soon as possible. There is also a need for more technical assistants (TAs) and research assistants (RAs) so that ongoing research is properly carried out. Trained personnel in this field can be developed from various resource pools that exist in the country.

## 3. Education

SQU has recently initiated its fisheries program and will be graduating students at the B.S. level in fisheries science and fisheries technology. These graduates can help fulfill the need for advanced degree candidates and personnel at the DGF and MSFC. For a healthy development of the sector, it is important that SQU operates as planned to provide graduates for all sector components, as anticipated. Furthermore, through a training program, a number of these graduates will be slated to return to SQU itself to help run their academic programs in fisheries. OTIC has been graduating laboratory technicians in the biological and chemical sciences since 1985. Some of these graduates have already entered into fisheries related jobs such as research technicians at MSFC. Both of these institutions are key links to in-country training for the fisheries sector.

## 4. Private

Some of the specific objectives of the country's development goals are to provide for expanded market outlets and improve fish handling and processing. Much of this is aimed at the export markets which demand high quality products. Training at the skills level and extension level will be necessary to improve the quality of fish products in Oman. Promotion of businesses in the development of seafood products and value-added products will necessitate the training of technicians. The private sector will also be involved in industrialized fishing through joint ventures with foreign companies. Policy will dictate that an increasing percentage of Omani crews be involved in vessel operations during the joint venture

contract. How and where these crews will be trained and how fast they can take over operations from expatriates is important for fisheries development in Oman.

In the past, fisheries development programs in many countries focused on increased production and development of infrastructure before human resources and expertise could be developed. This has led to several problems in these countries including poor management of the resource, neglect of the needs of the traditional fishermen, and inadequate research and educational programs in fisheries. By placing training as an integral component in reaching the country's goals, fisheries development will occur in a more rational framework. The effect of training will be felt in all components of the fishery sector - government, research, education, private enterprise.

## B. Project Goals

Specific project goals are as follows:

- 1) Manpower development for the government, research, education and private components for the fisheries sector.
- 2) Institution building.
- 3) Improved living standards for the traditional fishermen.
- 4) Increased employment and educational opportunities for women in Oman.
- 5) Sustainability.

### 1. Manpower Development

Lack of trained manpower in the areas of government, research, education, and private enterprise throughout the fisheries sector is considered a major constraint to fisheries development in Oman. There is insufficient trained manpower at the DGF to optimally run several of the departments. For example, the shortage of trained extension agents limits the working capacity of the division. In the research area there is a mandatory dependence on expatriates to run the research programs as well as the educational programs at the university and at the technical college. The private sector is also limited in its development and expansion capabilities. The current Fishery laws of Oman reserve the right of fishing for

Omanis only. Increasing the production levels of fish harvests mandates that Omani fishermen and the communities be trained in new techniques that allow them to expand their fishing potential.

## 2. Institution Building

The MSFC is fully staffed by expatriates who have signed contracts for various time periods. Although several of the research programs receive high marks for their design and implementation, there is the danger of lack of continuity in research if Omanis are not involved to a higher degree. It is recognized that this will only occur after a long but necessary process of graduate degree training, internships and working with expatriate counterparts. Essentially the same can be said for the institutions of higher education as well. The development of human resources for these institutions needs to begin as soon as possible to maintain well-run academic programs in fisheries. The infusion of trained personnel into DGF will have a positive effect over a period of time. Training will strengthen the managerial functions of the Ministry and will aid in the day to day operations. Trained technicians will also significantly contribute to the operations of various departments in the Ministry as mentioned previously. Returning graduates with advanced degrees should enter the DGF and eventually become top level administrators and have a significant impact on how the DGF is managed and operated.

## 3. Traditional Fishermen

It is essential in a fisheries development program that the traditional fishermen be given the opportunity to keep pace with development. Scaling up of vessels and gear is one way that this can be done without dramatically altering their position in the community. The most effective method for teaching traditional fishermen is through a meaningful extension program. Traditional fishermen, especially those in remote areas without access to new markets, often feel overlooked during development. Strong efforts can be made to reach these communities with Arabic speaking extension agents who are well trained and can demonstrate advanced fishing skills. Another avenue of reaching the traditional fishermen is through the training of the sons and daughters of the fishermen. If modernization becomes an official policy of the ministry, the most likely candidates for participation in technical degree training are the sons and daughters of the fishermen. They will have had secondary school training and would be willing to go through a long term training program for more advanced fishing technology.



#### 4. Women in Development

The fisheries development project, through its training component, can provide several unique employment opportunities for women. These opportunities exist at the MSCF and the university. At present, field work in remote areas by women does present significant problems in Oman. Nonetheless, work by female research scientists at the Mutrah fish market has been done on a regular basis over the last year. Women with advanced degrees could run research programs and teach at the university level. The demand for well trained Omani technicians is great throughout the country and women technicians in the laboratory are employed at both MSFC and SQU. Furthermore, there is the possibility of utilizing more women in the postharvest sector in processing and packaging of fish products.

#### 5. Sustainability

Sustainability of fisheries development in Oman will be assured only if a cadre of trained personnel is developed in the management, research, educational and private sectors of fisheries. A number of outstanding individuals will be trained overseas in the theory and practice of fishing management, operations, and research. Furthermore, direct counterpart training in the DGF with foreign experts will strengthen the policy related decision making. In-country skills training will provide all sectors with a means of upgrading their techniques and skills for their particular occupations. Institution Building, especially in the educational sector, will provide a mechanism for in-country training at all levels and assure sustainability of the training program as well.

#### C. Constraints In Training For Fisheries Development

As mentioned previously, Oman has made vigorous forward progress in economic and social development. Oman is just now seeing its first generation of secondary school graduates who can be further trained into various sectors of the economy. Although the country has done remarkably well in the last decade, there are some very real constraints for training in fisheries development that need to be addressed so that a proper training plan can be promulgated.

## 1. Resource Pool

Formal Education - There are approximately 18,000 students in Oman secondary schools, the majority of whom will graduate over the next five years. The numbers of students attending and graduating will increase by 20% per year over the next ten year period. This will be a valuable resource for undergraduate degree training as well as technical training at SQU and OTIC. SQU will not be graduating its first class in fisheries until 1990 or 1991 and there may be constraints for the advanced degree training.

Civil Service - Other potential resource pools for training are personnel at the DGF. Constraints at the DGF for degree training will exist as there are a limited number of employees with secondary or B.S. degrees. Potential candidates for degree training are those who have attended institutions abroad and have received their high school diploma or equivalent. All personnel can be considered candidates for skill training.

Fishermen - The traditional fishermen will need to be trained through an active extension program in Arabic. The only constraint here will be the willingness of the fishermen to be trained under certain programs. In general, one cannot expect the traditional fishermen to spend lengthy time periods away from their community learning new techniques. A realistic training program for the fishermen would have to be developed and conducted in or near fishing communities.

## 2. Government

At present the government has not established a clear policy for fisheries development in Oman. This is a major constraint for planning in training, especially for the traditional fishing sector and the private sector. If a modernization of the fisheries sector is to occur over the next decade, it is essential to know what types of boats will be licensed, which species of fish will be targeted for harvest and which markets are to be developed for the increased production. It can be assumed that the private sector will be responsive to a fisheries development program. However, there is little incentive for private companies to promote the training of Omanis in fisheries technology, processing and handling, etc. until a long-range plan for fisheries development is determined by the government.

### 3. Social-Cultural Impediments

There is some question as to the perceptions Omanis have with respect to the fisheries sector. On one hand at SQU, both the agriculture and fisheries related disciplines are among the last chosen by the students (e.g. medicine, engineering and the sciences are chosen first). Furthermore, many in the private sector may view fisheries as too risky a venture because of the unclear development policy. Within a short period of time there has been tremendous growth of the urban centers and employment and staffing of many of the Ministries as well as a strong push toward higher education. When this occurs there is a natural tendency for the young or middle-aged to leave occupations that deal in production (agriculture and fisheries) and seek well paid jobs with less risk in the cities. On the other hand, in the 1979 survey analyzed by Pollnac (1984), very few of the fishermen were thinking about leaving the fishery sector. In general there was a high degree of job satisfaction and satisfaction with this way of life. It has been almost ten years since that survey was conducted and a new survey should be done.

### 4. Infrastructure

There are less infrastructure constraints in Oman than one would find in most developing countries. SQU and MSFC are impressive institutions, well equipped and maintained. OTIC has an impressive infrastructure as well, and the development of a two year program in fisheries at OTIC is a viable alternative for in-country training. Infrastructure for extension work is more problematical. A good extension program in Oman is one that would reach out to the fishermen in their community. There is a system of workshops along the coast that can be used for short term training. However, at present there are too few extension agents to realize this goal.

### III. Methodology

#### A. Introduction

Determining the training needs for the four components of the Oman fisheries sector requires a methodology flexible enough to extract assessment strategies based on the diagnostic principles of Project Participant Needs, Sector/General Labor Force Needs as well as Alternative Strategies to Participant Training.

Time restraints demand that information gathering be selective yet reflective of the entire sector. Working to our advantage is the wealth of collected information at the disposal of the Omani/American Joint Commission, RDA International and The Marine Science Center (a bibliography is attached in the appendix). Written materials serve as the foundation for the more difficult task of gleaning the unreported agendas of the key informants in the varying fisheries associated sectors. The assessment team reviewed the literature as preparation for interviews with key informants and as a means of differentiating objective information from seemingly biased or self-interested information.

The assessment was conducted within the parameters set forth by the Handbook 10 guidelines and within the framework of the Training Needs Assessment Guide (TNAG). The TNAG served as the model for the collection and analysis of information as well as the basis for determining alternative participant needs.

#### B. Sector Force Labor Needs Assessment Methodology (SLFA)

Under the guidelines outlined in the TNAG, a literature review (project reports, country plan reports, sector reports and government statistics) was conducted to determine demand and supply criteria for the sector, followed by an analysis of the information for verification of accuracy and applicability to project training needs. Key informants (members of the research, scientific, academic, and government community) were utilized to review quantitative measures that either seemed skewed or seemed so generalized as to require further qualification. A substantial amount of information utilized for policy decision making is based on a mix of hard information and reasonable doubt analysis. A common thread throughout the literature and interview sources was the need for continued and more consistent scientific data collection for the formulation of rational policy decisions.

The sector labor force needs assessment served a critical role in the methodological approach because of the major assumptions made regarding the available manpower pool estimates. The basis for a sustainable training effort rests on a scheduled phase-in of Omanization at the research, the professional and the technical level. Of special concern was whether the hard data accurately reflected the manpower pool available to the fisheries sector. That information was cross-referenced through interviews with key informants.

#### C. Project Related Training Needs Assessment (TNAG)

The methodological approach utilized for assessing project related training needs varied with each component. 1) The diagnosis of participant training needs was conducted through an extensive literature review and with minor input from key informants (primarily for clarification of documentation). 2) The identification of staff to undertake the training was determined primarily through interviews held with key informants, although Third Country recommendations were based on a review of literature collected by the RDA and Checchi group. 3) The process for selection of specific individuals followed the guidelines of Handbook 10 unless the recommendations fell under alternative approaches.

Special emphasis, through the interviewing of key informants, was placed on the role that the University is expected to play in providing the sector with its trained personnel needs. Key informants reinforced the notion of Omanization and sustainability prevalent throughout the literature regarding training at the professional and scientific levels as well as on the private and artisanal side. Training in the area of extension must also demonstrate a component that leads to eventual phasing out of large scale outside assistance (any extension effort must become self-sustaining since the introduction of new gear technology and fishing methods is an ongoing process). The determination of the numbers and areas of training to be conducted is based on collected information that is consistent with the objectives of Omanization and sustainability.

#### D. Alternative Approaches To Participant Training

Alternative approaches to standard training needs assessment methodology were required to compensate for the inability of present USAID training guidelines to meet some of the needs of the fishery sector. The recommendations for expanding the capabilities of the Oman Technical and Industrial College, Sultan Qaboos University or the

development of a Fisheries Training Center fall under the alternative approach guidelines. The data collected for this component resulted primarily from interviews with key informants and analysis of the information among members of the project paper team.

A great deal of the information collected emphasizes the significance that institutional building plays in the development of viable educational/training institutions (SQU, OTIC or specialized institutes).

USAID project assistance is finite and replacements for the present and future expatriate technical assistants must be trained to sustain the present level of activity and to increase effort if required. The accomplishment of this goal will require a near term effort that is directed towards a goal of institution building to ensure that the University has the manpower to provide quality education. (A sister relationship with a US institution might serve as an appropriate vehicle to build on the capabilities of SQU and OTIC.)

#### IV. Results and Discussion

##### A. Result Summary

Based on a training needs assessment the manpower requirements for the fisheries sector are as follows:

Degree Training - Total needs are for 226 individuals

- a) 14 - Ph.D. level
- b) 24 - M.S./M.M.A. level
- c) 51 - B.S./B.A. level
- d) 137 - Technical College level

Non-degree Training - Total needs are for 229 individuals:

- a) Skill Training - 220
- b) Study tours - 9

Adequate resource pools exist for training at the technical degree level and at the B.S. level. The resource pools for advanced degrees will not be sufficient to meet the needs during the life of the project. Non-degree training will involve personnel from the various sectors of fisheries, including the government, research, education and private sectors. With regard to a time frame of when these needs will be met, the manpower requirements at the technical college level will be met by the last two years of the project. The manpower requirements for the B.S. level will be met in the last phase of the project. However, there will be shortfall of qualified candidates at the B.S. level to be sent for advanced degree study during the first four years of the project. Consequently, the manpower requirements for the M.S./M.M.A. level will not be met during the life of the project. Furthermore, the project will not graduate enough students at the B.S. and M.S. level to supply an adequate resource pool for doctoral degree training. Therefore, manpower requirement needs will not be met during the life of the project for the Ph.D. degrees as well. Every effort should be made to continue the advanced degree program beyond the project years so that the manpower requirements will be met by the year 2000.

Non-degree training requirements can be met through a series of skill training for both the public and private sectors. These will include short intensive courses of one to two weeks duration and day-release courses over a six or twelve week period. Study tours will provide a diverse exposure in fishery operations for the directors of several departments for the government.

## B. Degree Training

### 1. Resource Pool

Resource pool data are shown in figures 1-4. The resource pool for candidates that will enter OTIC and SQU clearly exceeds the available positions that exist in these two institutions. It is estimated that there will be approximately 4,800 secondary school graduates by 1990.<sup>1</sup> This will increase at a rate of about 20% per year over the next decade. The freshman class for SQU is 500 students. In the Department of Fisheries Science and Technology, there will be a maximum of forty students (twenty in each division) by the year 1992. The supply of high quality students will far exceed the openings for B.S. candidates at SQU. For OTIC we find similar results. In 1990 OTIC will have an entering class of 250 students. In the early phases of the project, the OTIC candidates would be entering the laboratory science programs (biology and chemistry) with the intent of being lab technicians at SQU or MSFC. By 1992, a full program in fisheries should be implemented and the number of students would increase correspondingly. The maximum will not exceed 50 as there are space limitations at OTIC.

A different situation is shown for the advanced degrees. The available qualified candidates for the masters program will not meet the needs of the program. SQU will provide its first graduating class in 1990 or 1991. This class will have a maximum of 18 graduates. Not all of these candidates would qualify for a graduate program, and it is estimated that only the top 20% of the graduating class can be considered for advanced degree work. This is supplemented in the first few years with returning degree candidates from abroad. There is a projected need for 38 degree students at the masters level (includes termination masters and those that go on for Ph.D. degree). The B.S. resource pool will be a constraint as best estimates show a total of 33 being qualified to enter the M.S. program in the project years. If the graduate degree program is carried out until 1998 these needs can be met.

Similar constraints are found in the Ph.D. program. The number of qualified Ph.D. candidates will be few throughout the program. The early years of the program will have to draw on returned candidates at the M.S. level in fisheries related sciences (including biology and chemistry). Through 1993, estimates show that only two candidates per year will be qualified and that only one will be sent for the Ph.D. program. Most Ph.D. programs are a minimum of three years in duration and it will be difficult to fulfill the requirement needs by the end of the project.

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<sup>1</sup> Estimates are based on the Oman Statistical Yearbook, 1987.



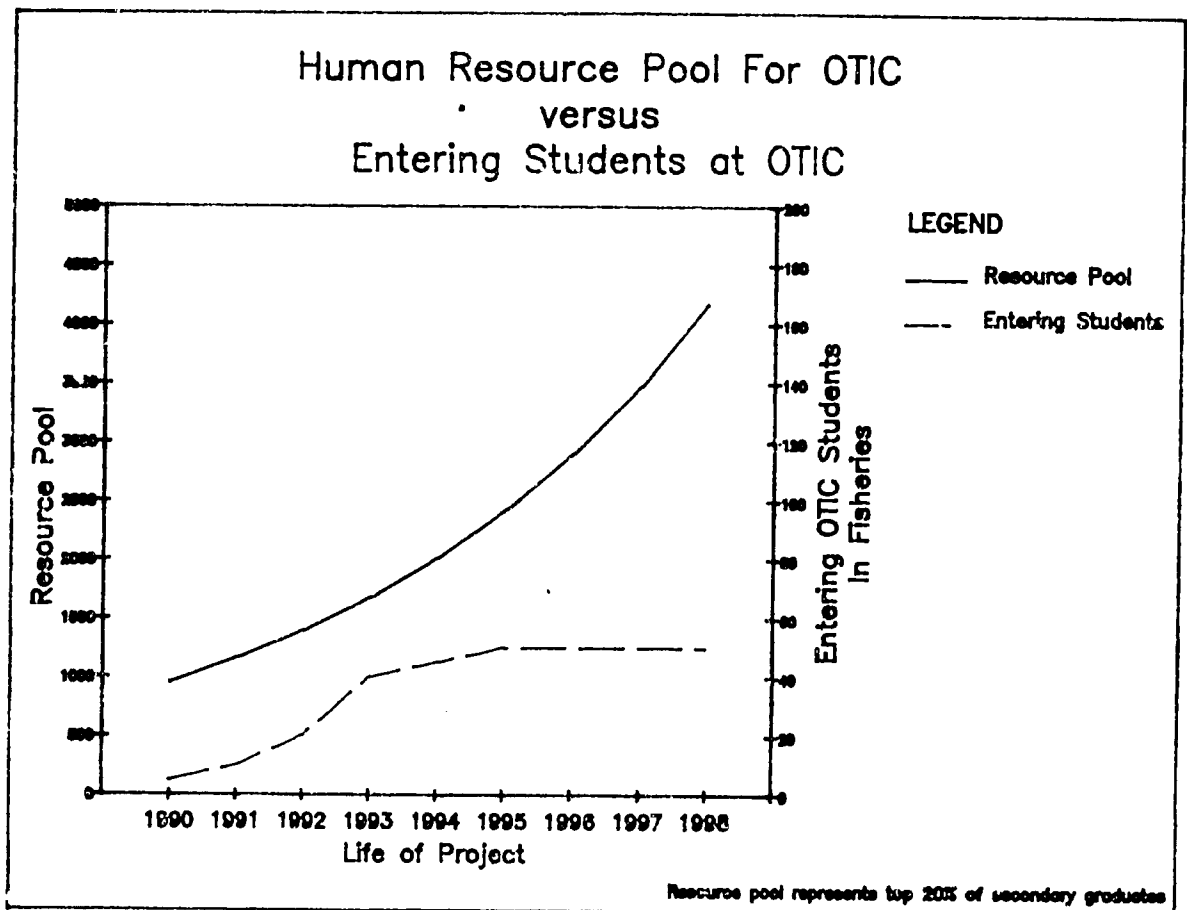
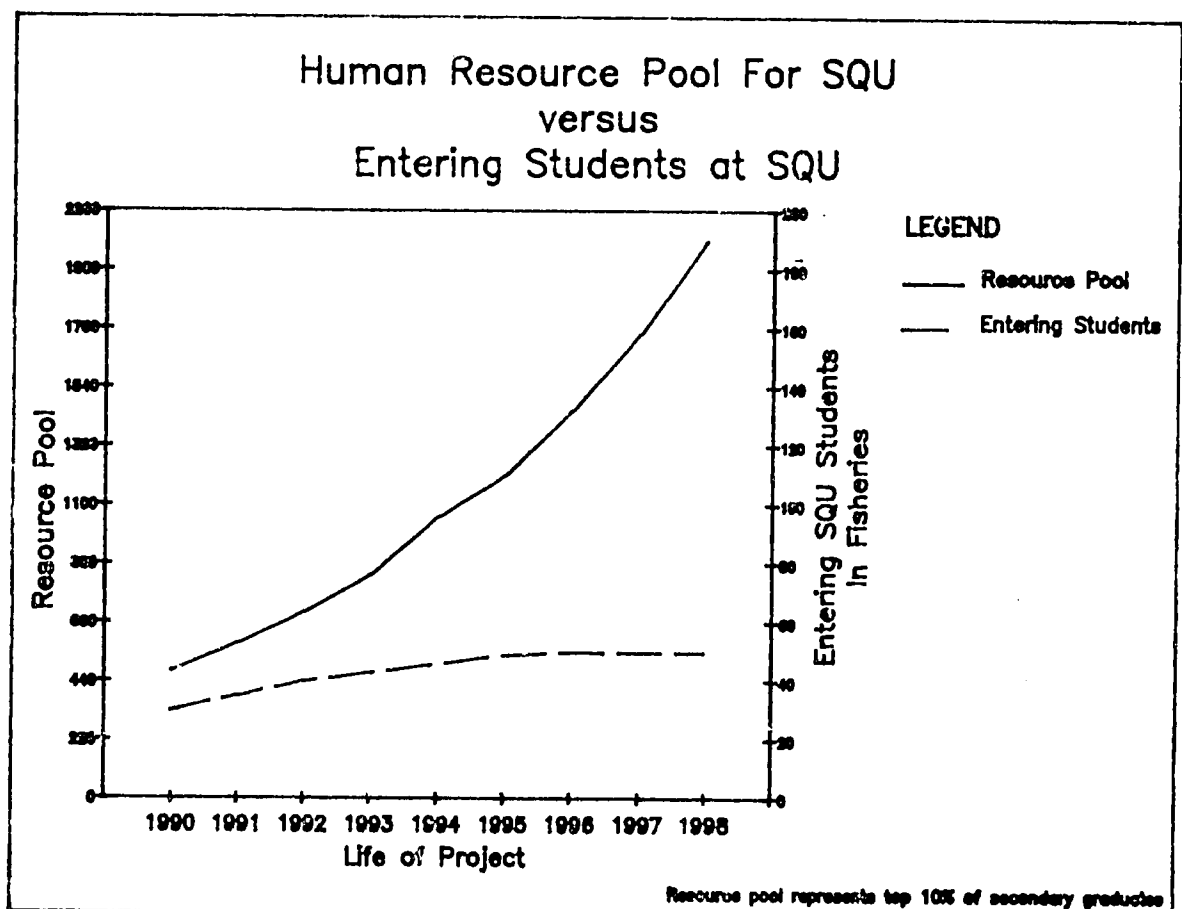


Figure 1. Human resource pool for OTIC

Figure 2. Human resource pool for SQU



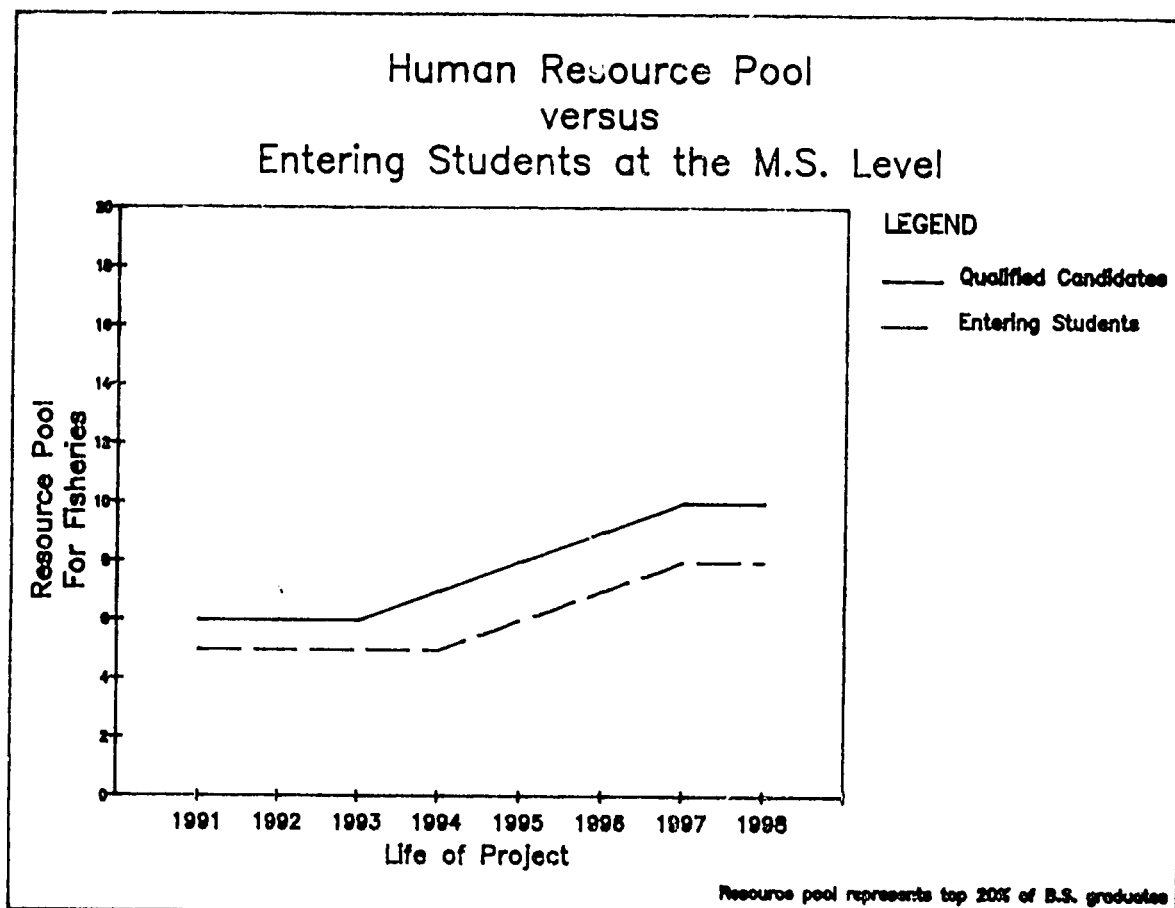
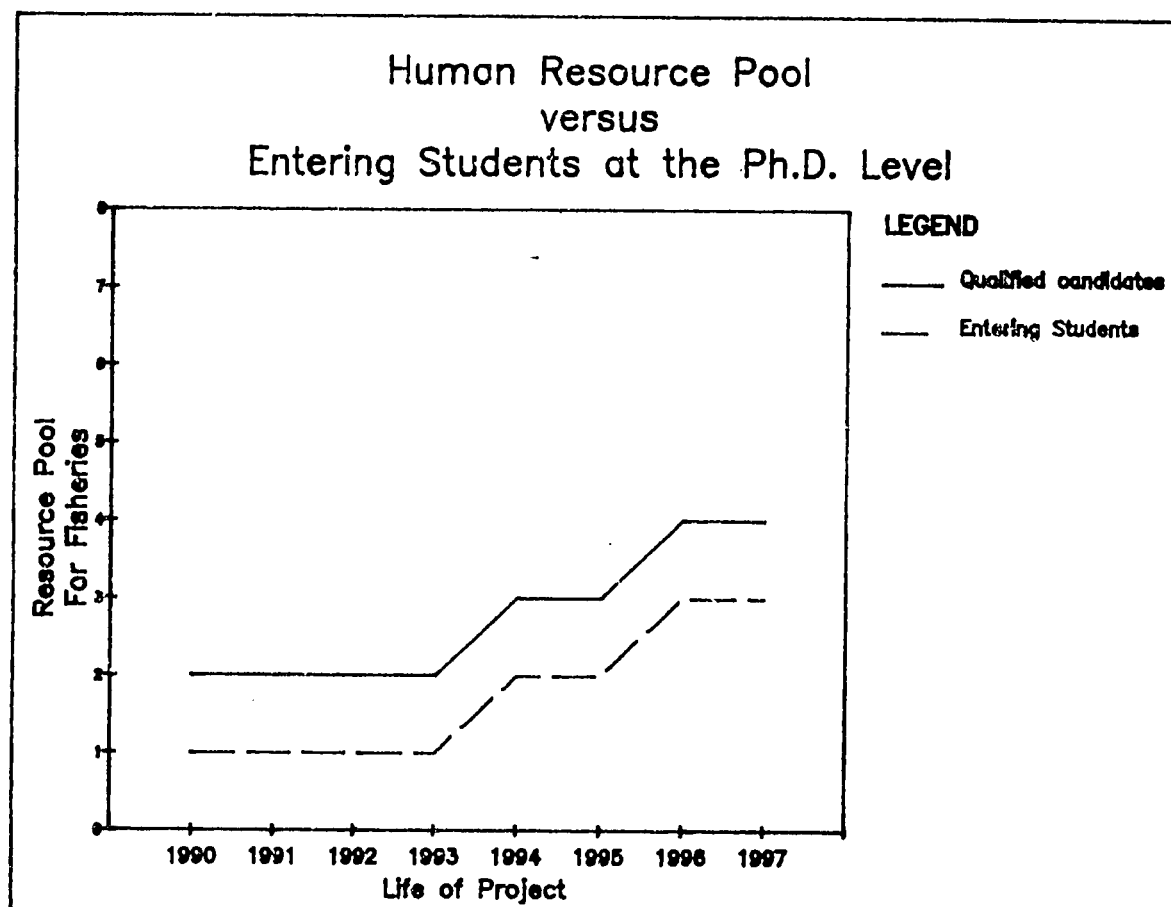


Figure 3. Human resource pool for M.S. candidates.

Figure 4. Human resource pool for Ph.D. candidates.



## 2. Identified Needs

The manpower needs assessment are shown in Tables 1-5. They are divided by sectors including the DGF - Muscat, DGF - Salalah, MSFC, SQU, and the banking sector. Total manpower needs for these sectors at the degree level are summarized in Table 1 and total 219. The needs for the DGF - Muscat are for 74 individuals to receive degree training, 48 at the two year technical level, 18 at the B.S./B.A. level, 7 at the M.S. level and 1 Ph.D.<sup>2</sup> A constraint that was mentioned in the introductory sections should be re-emphasized here. The number of candidates at the DGF for degree level training is very limited as few have secondary education. Most of the candidates for training would represent new personnel that would have to be incorporated into the DGF upon finishing their degrees.

The DGF - Salalah will have substantial training needs as well.<sup>3</sup> Salalah can be thought of as an autonomous division and their training requirements are important to fisheries development and management in the southern regions. Total training needs for Salalah are for 59 individuals, of which 32 are at the two year technical degree level, 19 at the B.S. level, 7 at the M.S. level and 1 Ph.D. The majority of the degree training from the B.S. to Ph.D. level reflects the development of an active research program in Salalah. This is based on the assumption that the DGF will support creation of a research section in the South. These research positions are included in the assessment with the understanding that trained research personnel with advanced degrees should have priority in filling the MSFC and SQU positions.

MSFC has substantial training needs, especially for advanced degrees.<sup>4</sup> Omanization for fisheries research at MSFC dictates that the majority of the M.S. and Ph.D. trainees be dedicated to fulfilling expatriate positions at the MSFC. The total needs are for 68 trained individuals, 44 at the technical degree level, 9 at the B.S. level, 7 at the M.S. level and 6 at the Ph.D. level. The B.S. trainees are needed as research assistants, and technical college trainees are essential for carrying out the day to day operations of the research center as well as research, laboratory and field work.

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<sup>2</sup> Estimates for the DGF - Muscat are based on the RDA report, "Training Requirements to the Year 2000", and our own analysis based on reports and interviews of DGF and RDA staff.

<sup>3</sup> Estimates for the DGF - Salalah are based on several reports which note the importance of the Southern region for fisheries development, interviews with personnel in Salalah, and our own analysis.

<sup>4</sup> Estimates for the MSFC are based on the RDA report, "Training Requirements to the Year 2000", R. Dudley's "Updated Degree Program Training Needs for Center Staff by the Year 2000", and our own analysis based on interviews with MSFC staff and analysis of the resource pools for advanced degrees.

Proportionally, SQU has high requirements at the advanced levels.<sup>5</sup> This is because of the high standards that SQU has placed on its faculty -both expatriates and nationals. Total requirements are 20, of which 6 are at the technical college level, 5 at the B.S. level, 3 at the M.S. level and 6 at the Ph.D. level. The need at SQU for laboratory and research assistants will be filled by the B.S. level trainees. The technical college trainees will be utilized in the laboratories and on the research/teaching vessel. The University, through the Ministry of Education, has its own program to fund Omanis for graduate degree training. These candidates would return to teach at the University. This program has suffered cutbacks in the last few years and it appears that the scholarship program at the university will not fulfill these needs over the next ten year period. Therefore, the OAJC should undertake advanced degree training to compliment the internal scholarship funding to assure a high quality program in fisheries at SQU.

The requirements of the banks are modest and number seven.<sup>6</sup> Regional banks require their own personnel to be trained in fisheries technology to increase their understanding of the needs of the fishermen and the private industry. This can be done at the Technical College level.

The private sector will compete for the pool of graduating students at the technical college and B.S. levels. Their needs at the degree level are dependent on development policy defined by the government and the speed of fisheries development in Oman. The vast majority of the needs of the private sector are in the non-degree training section described ahead.

Table 1. Manpower Requirements In Degree Training

	Fish Tech	Fish Sci	Computer	Trade	Admin	B.S./B.A.	M.S./M.M.A.	Ph.D.	Total
DGF									
Muscat	15	24	6	1	2	18	7	1	74
Salalah	7	18	3	3	1	19	7	1	59
MSFC	9	24	2	5	4	9	7	6	66
SQU	4	2				5	3	6	20
Bank	7								7
Total	42	68	11	9	7	51	24	14	226

<sup>5</sup> Estimates for manpower needs for SQU are based on interviews with SQU staff and our own analysis of the needs and resource pools.

<sup>6</sup> The requirements of the banks are based on an interview with the National Agriculture and Fisheries Bank training officer.

Table 2. DIRECTORATE GENERAL OF FISHERIES - MUSCAT TECHNICAL & DEGREE TRAINING INVENTORY

Departments	Fish Tech	Fish Sci	Computer	Trade	Administration	B.S./ B.A.	M.S./M.M.A.	Ph.D.
1) Office of the Director					1 Secretary	1 Accountant *1 Mar. Affairs (b)	*1 M.M.A.	
2) Office of Administration				*1 Mechanic	1 Head Clerk	1 Accountant	*1 M.M.A.	
3) Licensing and Enforcement		*10 Enforce- ment Agents (a)				*2 Marine Affairs	*2 M.M.A.	
4) Extension and Training	1 Admin Asst *10 reg ext *2 ves capt (a) *2 ves eng (a)					*1 Fish Tech 1 Communication *1 Fish Tech	*1 Fish Sci	
5) Fisheries Planning		*10 Data Col- lector *4 Market Samplers	*6 Computers			*1 Mar Affairs (b) 1 Computer 5 Fish Bio *(3) *1 Statistics *1 Resource Econ *1 Food Science	*1 Statistics *1 Fish Bio	*1 Fish Bio
Totals	15	24	6	1	2	18	7	1

(a) Additional 3 months specialized training

(b) With minor in Public Administration

(c) Identified by RDA

\* Priority

Current Positions	Proposed Max Training Load	*Min Training Load
169 c	74	62

Table 3. DIRECTORATE GENERAL OF FISHERIES - SALALAH TECHNICAL & DEGREE TRAINING INVENTORY

Departments	Fish Tech	Fish Sci	Computer	Trade	Administration	B.S./ B.A.	M.S./M.H.A.	Ph.D.
1) Department Administration				*1 Mechanic	1 Accountant	* 1 Finance * 1 Accountant		
2) Research (a)		*4 Fish Scientists				3 Fish bio * (2) *1 Invertebrate Bio 1 Marine Ecol 1 Aquaculture 1 Marine Affairs	4 Fish Bio *(2) *1 Crustacean/ Mollusk	*1 Marine Bio
3) Statistical & Data Analyses			3 Computers			*2 Statistics 1 Computer 1 Resource Econ	1 Resource Econ	
4) Technical Services and Extension	2 Fish Tech *5 Fish Tech for ext			2 Eng Constr		*2 Fish Tech *1 Marine Affair		
5) Fisheries Affairs		*8 Enforcement Agents (a)				*1 Marine Affair *1 Food Science	1 Food Science	
6) Data Collectors		*6 Data Collectors				*1 Statistics		
Totals	7	18	3	3	1	19	7	1

(a) Based on assumption that DGF Supports creation of research section in Salalah.

(b) Figure provided by DGF, Salalah

\* Priority

Current Positions	Proposed	
	Max Training Load	*Min Training Load
70 b	59	41

Table 4. DIRECTORATE GENERAL OF FISHERIES - MSFC TECHNICAL & DEGREE TRAINING INVENTORY

Departments	Fish Tech	Fish Sci	Computer	Trade	Administration	B.S./B.A.	M.S./M.M.A.	Ph.D.
Marine Science and Fisheries Center	*2 Boat Capt *2 Marine Eng *2 Fish Gear Technology 3 Divers	*14 Fish Sci *10 Data Collectors	2 Data Processors	1 Carpenter 1 Welder 1 Electrician 1 Plumber 1 Construct	1 Library 2 Word Processors 1 Accountant Administration	*1 Lib Science 1 Comp Science 1 Public Admin *6 Fish Science	*1 Fish Biology (aquarium) *5 Fish Science *1 M.M.A. (a)	2 Mar Bio (b) *3 Fish Bio *1 Crust Bio
Totals	9	24	2	5	4	9	7	6

Table 5. SULTAN QABOOS UNIVERSITY TECHNICAL & DEGREE TRAINING INVENTORY

Departments	Fish Tech	Fish Sci	B.S./B.A.	M.S./M.M.A.	Ph.D.
Department of Fisheries	*2 Fish Tech *1 Ves Operator *1 Ves Engineer	2 Fish Science	*2 Fish Sci *2 Fish Tech *1 Food Sci	*1 Mar Aff *2 Fish Tech Sci	*1 Fish Bio *1 Fish Science 1 Bio Oceanogr *1 Fish Economist 1 Seafood Tech 1 Crustacean Bio
Total	4	2	5	3	6

Current Positions	Proposed	
	Max Training Load	*Min Training Load
5	20	15

AGRICULTURE AND FISHERIES BANK  
TRAINING NEEDS

Technical College 2 years Undergraduate and Graduate

Fish Tech	Fish Sci	B.S./B.A.	M.S./M.M.A.	Ph.D.
*7 Tech Fish				

Current Positions	Proposed	
	Max Training Load	*Min Training Load
7	7	7

\*Priority



### 3. Time Frame

A time frame, describing the numbers of students and the year they enter degree programs, the numbers of students and years they are in the programs, and the cumulative number of graduates in said programs are described in figures 5 - 8. Students in the fisheries related fields at OTIC will enter the program at a significant level by 1992. This will be complimented by students who will receive two year training in the U.S. and third countries in the early phases of the project. By 1994 there will be more than seventy graduates. This number will rise to more than 200 graduates over the life of the project. This time frame is adequate for fulfilling the assessed needs for trained personnel at the technical college level for government, research and the university. Furthermore, many of the technical college graduates will find employment in the private sector as the fishing industry develops.

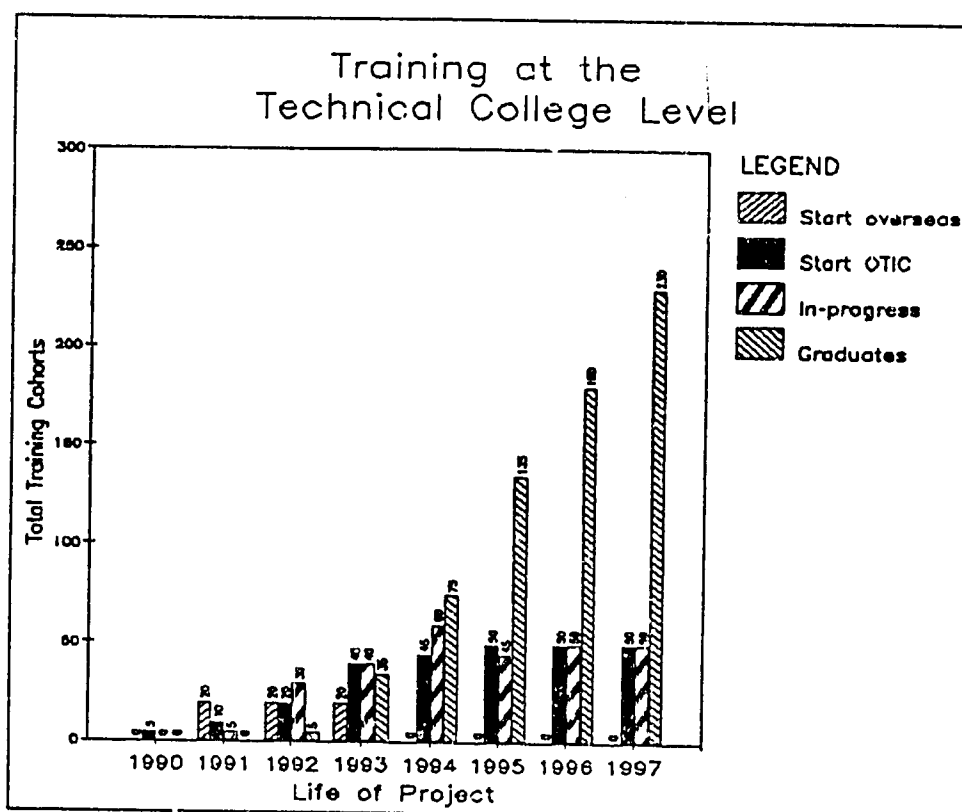


Figure 5. Time-frame for training at the Technical College level.

The manpower needs at the B.S. level will be met by the year 1995, as the total requirement at the B.S. level is for 90 individuals. This number includes graduates with B.S. degrees who will enter into the work force in fisheries and those who will be chosen to go on for their M.S. and Ph.D. degrees. These calculations are made with the assumption that SQU will provide approximately 15 graduates in its first class by 1991. If their program goes according to plan there will be a steady increase of students in the graduating class, until 1995, when it will reach a maximum of fifty. This includes twenty in the fisheries technology section, twenty in the fisheries science section and five to ten in related science fields (biology, chemistry, computers) that could enter the fisheries related programs. This will be complimented in the first phase of the project by several B.S. candidates from the government who would not qualify for training at SQU but could enter B.S. degree programs in the U.S.

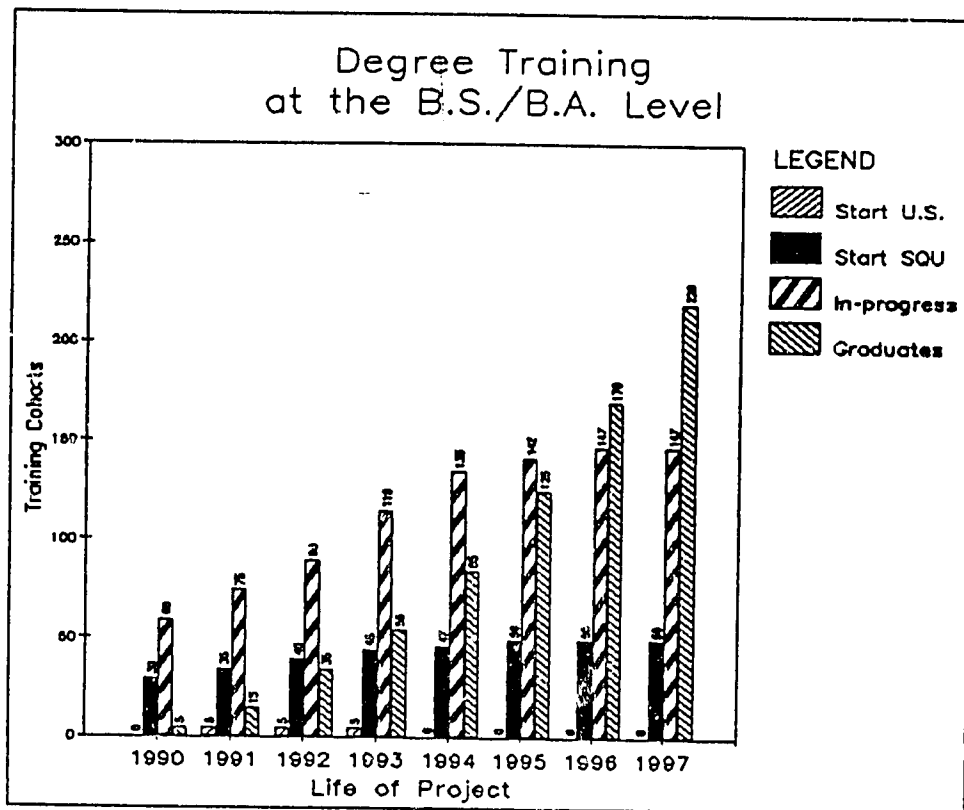


Figure 6. Time-frame for training at the B.S. level.

The M.S. program will suffer constraints, as the low number of qualified B.S. students in the early phases of the project will limit the entry of candidates into graduate degree programs. A total of fifteen students will be entering the M.S. program in each of its first four years. Graduates will not return in significant numbers until midway through the project. Several of these returning graduates will enter research programs at MSFC and undertake teaching/research duties at SQU. The more promising candidates will directly enter a Ph.D. program identified by the training officer. Because of the needs at both the operational level and Ph.D. candidate level, the degree training at the Masters level will not meet the training needs by the end of the project. The identified needs for the M.S. level are for 38 individuals and it is estimated that 33 individuals can be trained during the life of the project. The primary constraint is the number of candidates with a B.S. degree that can immediately go into training at the early phases of the project.

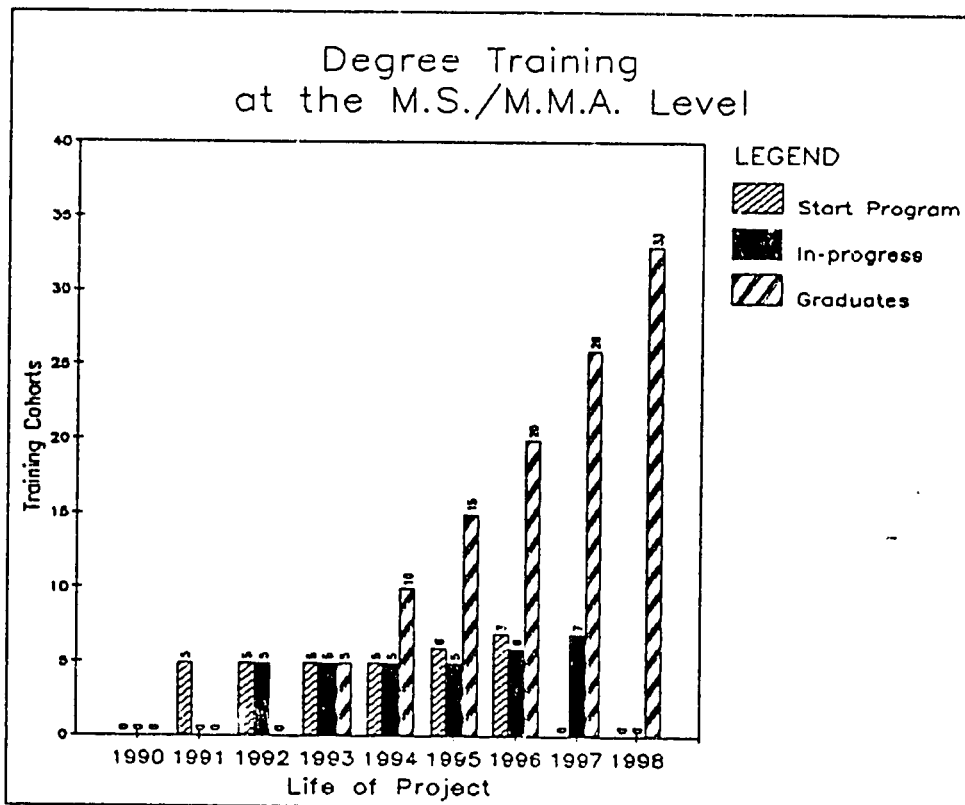


Figure 7. Time-frame for training at the M.S. level.

The Ph.D. training will not meet the manpower requirements at the Ph.D. level during the life of the project. The assessment has identified a training need for 14 individuals at the Ph.D. level. However during the life of the project it is estimated that only 8 doctoral candidates will be trained. The program will start out very slowly with only one Ph.D. candidate each year through 1993. By 1996, it is projected that a total of 4 Omani doctorates in fisheries would have returned to the country. One could project that it would take until the year 2000 before the returned Ph.D. candidates would meet the assessed needs of the country in the fisheries sector.

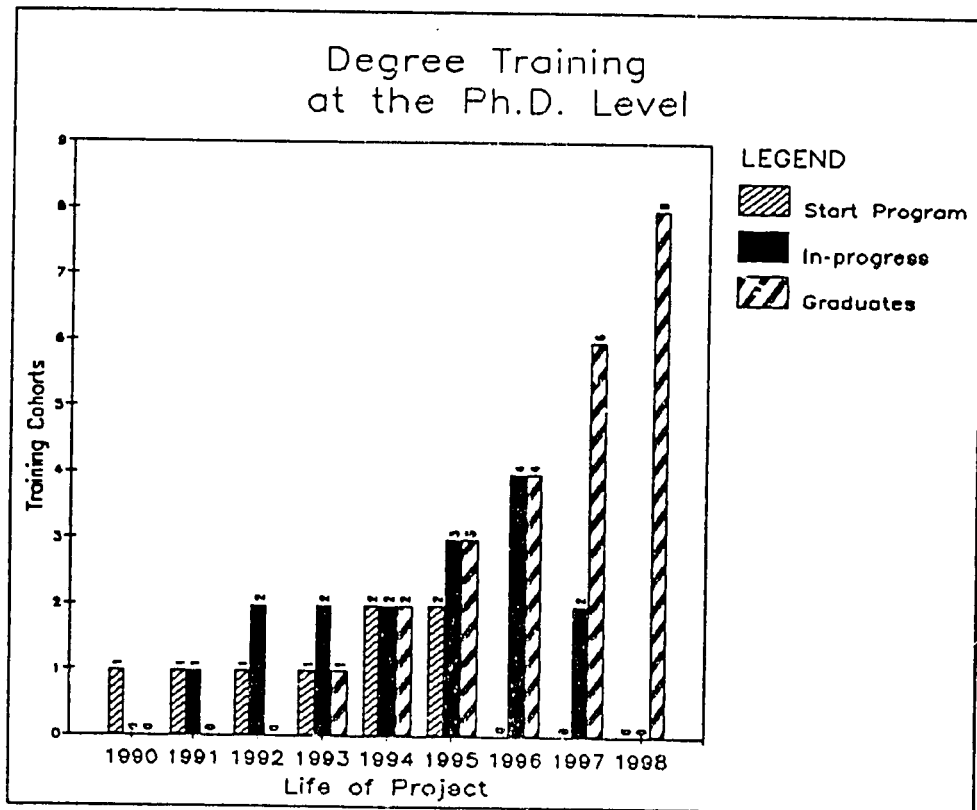


Figure 8. Time-frame for training at the Ph.D. level.

## C. Non Degree Training

### 1. Public Sector

The total number of individuals for training in the public sector is 229 through the life of the program.<sup>7</sup> There will be 130 trainees in day release programs and 90 trainees in intensive courses, and 9 in study tours. These are presented in Figures 9 and 10. The majority of these courses can be taught by OTIC staff or in-country TA staff. These courses would include: computer training, software applications, administration short courses, sampling and data collection, fish handling and preservation, marketing, sanitation, specialized fisheries technology and marine affairs courses. Special courses such as those that are related to the observer program would require out-of-country expertise. OTIC has undertaken both day release courses and intensive training courses for the Ministry of the Environment and similar arrangements can be made for the Ministry of Fisheries. Specific courses for training will also be identified by the Training Officer in coordination with the DGF and implemented accordingly.

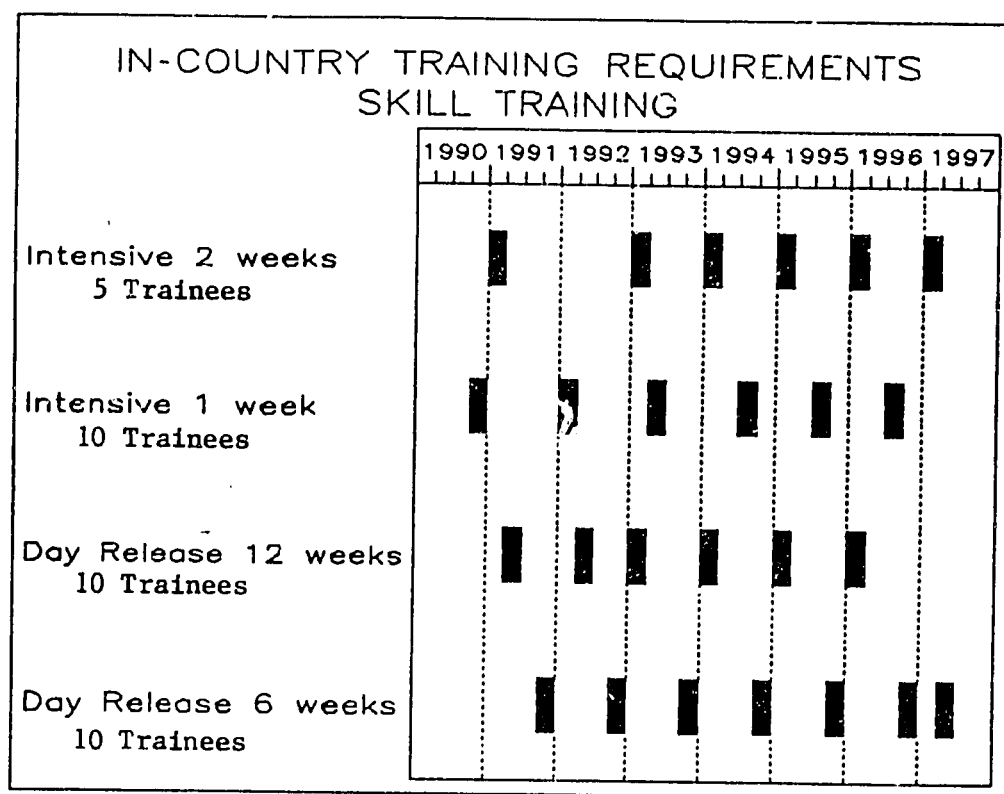


Figure 9. Training requirements - skills training.

<sup>7</sup> Skills training and study tour needs are based on RDS reports, and interview with RDA and DGF personnel.

Short term study tours are focused to give the Directors of several of the departments of the DGF and others an exposure to different methods of fishery operations. There will be 9 one-month to two-month study tours throughout the life of the project. The majority of these programs will occur in the U.S., however they could be a mix of third country and U.S. study tours to provide a broader exposure. Countries that have similar development situations to Oman or similar fishery operations should be considered in the study tours. The tours should be staggered so that the DGF does not experience operational problems during the absence of the Department Head.

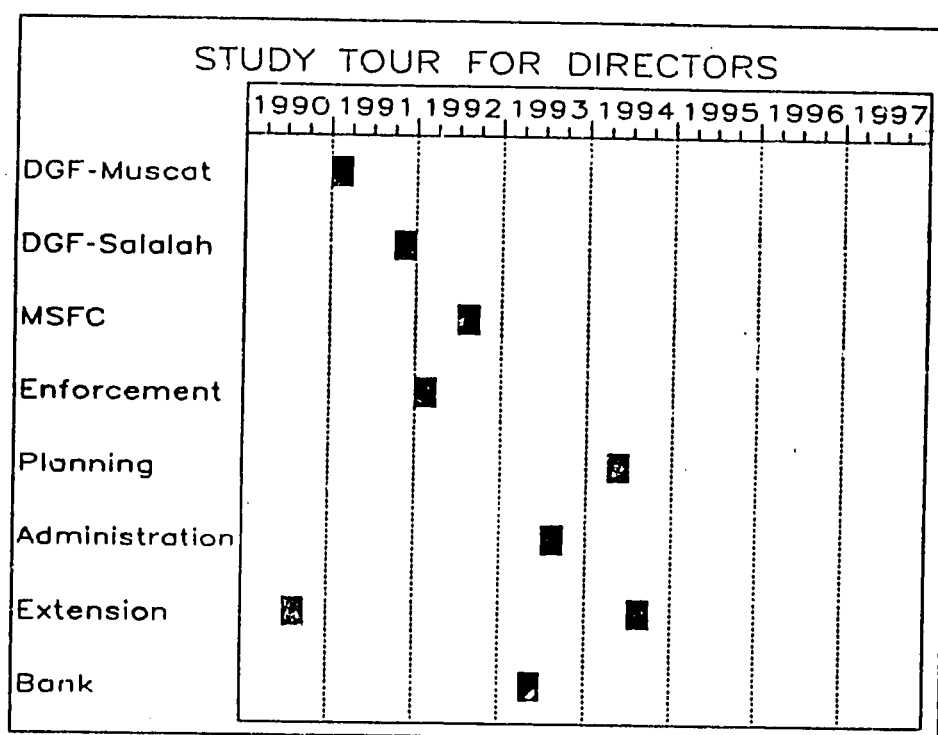


Figure 10. Training requirements - study tours.

## 2. Private Sector

The non-degree training needs for the private sector are shown in Table 6. Because policy with regard to fisheries development is in the state of transition in Oman, non-degree training needs are broken down into three possible scenarios.<sup>8</sup> Private sector training needs should be reassessed in the next few years when policy is more clearly defined. The first case is the status quo, where fisheries development is slow and growth is between 3-5% a year. Relatively few new boats have come on-line, and the majority of the fish is harvested by small launches that may or may not have been equipped to carry ice and new equipment such as small winches. Nonetheless, training needs still exist as there is a strong pressure to export fish and improve its quality. Consequently, short courses in fish processing and handling as well as quality control will be needed for the private sector and should be given high priority in the early phases of the project. The sector will also benefit from courses in administration and management. In the first case scenario, the training of the fishermen in upgrading their gear and in fish handling and quality would come under the auspices of the extension program in the DGF.

The second scenario is a rapid expansion with the introduction of small trawlers, sardine purse seiners, tuna vessels and large freezer trawlers. The estimates we have given here are based on the RDA report for fisheries development to the year 2000. Our numbers are scaled back from RDA, as the project should end by 1997. In this case, the traditional fishermen have been given the go ahead to upgrade their boats. Many have been given the financial backing and are operating small trawlers and purse seiners from 35-50 feet. Short-term training in trawling and seining operations will be needed for the crew. Approximately 1,000 fishermen should be trained in these fishing techniques. The larger trawlers, purse seiners, and freezer trawlers will come in under a program of joint ventures between Omani and foreign companies with foreign crews. They will eventually have to be replaced by Omani crews. One year programs are needed for selected participants to receive certificates for vessel operation. This requires extensive training, both in-country and abroad. We have calculated a number of 500 Omani fishermen designated for one-year certificate training. With increased fisheries effort there is a multiplier effect in all areas of postharvest

<sup>8</sup> The training needs for the private sector are based on the RDA report "Indicative Long-Term Fisheries Development Plan", Christiansen's report "Recommendations for the Development of the Oman Fishing Fleet", and interviews with personnel from RDA, the DGF and individuals in the private sector.

technology. Approximately 1,350 individuals should be trained in processing and services, 1000 in wholesale and retail short courses, and 100 in administration and management. The expenses of such a training program will have to be undertaken by the companies themselves. Nonetheless, the private sector should work in conjunction with the TC to identify likely candidates.

A middleground scenario is one in which the sector expands through an upgrading of boats to larger boats for the traditional fishermen and through the utilization of small trawlers and purse seiners. In this case short term training (with a significant portion of on-board demonstration) would be necessary for 1,150 traditional fishermen. Approximately 800 need to be trained in the processing and service sector and 400 in wholesale and resale. Administration training would involve 70 individuals. One-year training for vessel operators would involve 70 fishermen as well as 40 individuals in the service sector. A total of 10 individuals in marketing and 5 persons in administration were identified.

The training for the private sector in areas such as quality control, sanitation, seafood handling and processing should be done on an ad hoc basis during the early phases of the fisheries development project. The COP and his staff will serve as liaison between the private seafood industry and the government to determine their specific needs. Once these needs are established, the TC will coordinate training activities such as short-term intensive training workshops. The costs of the workshops should be shared among the private sector, the government and the project. For example, the tax paid by the companies for expatriate labor might be redirected towards training expenses. Another cost sharing scheme could be the use of fisheries project TAs as training instructors with the private companies paying for the cost of the training materials use of facilities, etc.



Table 6

## Private Sector Needs Assessment

	Short-Term Skill Training				One Year Non-Degree Training			
	Fish Tech	Fish Sci	Marketing	Admin- istration	Fish Tech	Fish Sci	Marketing	Admin- istration
Industry Remains Static	100 processing	25 quality control	20	20 computers 10 fishery law/mgmt				
Total	100	25	20	30				
Sector expands as envisioned by RDA report on Indicative Long-Term Fisheries Plan	1000 trad fisherman 100 small trawlers	1200 plant production 125 service sector	500 whole-sale 500 retail	75 computers 25 fishery law/mgmt	50 small trawlers 100 tuna vessels 100 purse seine 250 freezer trawler	100 service sector	25	25 computers 25 fishery law/mgmt
Total	1,100	1,325	1,000	100	500	100	25	50
Sector expands with vessels under 50 ft	1000 trad fishermen 100 small trawler crew 50 purse seine crews	100 service sector 700 plant production	200 whole-sale 200 retail	50 computers 20 fishery law/mgmt	50 small trawlers 20 purse seine	40 service sector	10	5 fishery law/mgmt
Total	1,150	800	400	70	70	40	10	5

## D. Discussions

### 1. Fisheries Training Institute

There has been a strong push for the development of a separate FTC under the control of the DGF. The rationale for this is the belief that fisheries development will occur at an accelerated rate through the next ten years. Under this plan fish production will increase from the present capture of 100,000 MT to 400,000 MT by the year 2000. The current fleet is not capable of increasing its production to that extent and several development plans have been promulgated. One scenario is a gradual modernization of the fisheries which will include the use of larger vessels. In addition there will be an introduction of new techniques for the traditional fishermen so that they may increase their efficiency and catch, and have the opportunity if they so desire to upscale their vessels. Nonetheless, trawlers and purse seiners will most likely be added to the fleet to increase the fishing potential for demersal species and harvest the abundant pelagic species that presently exist off the coast. This technology will be new to Oman and the traditional fishermen. Omani crews will have to be trained so that a gradual replacement of foreign crews by Omanis will take place throughout a designated time frame.

The idea behind the FTC is to have a structure that will allow the DGF to do this. At this time it is only in the concept phase. The disadvantages for building an FTC would be the initial building costs, estimated annual operation cost of more than 1 million R.O., and the time necessary to get the program off the ground. The costs have been calculated to be the following:

Construction of facilities	R.O. 500,000
Equipment	R.O. 500,000
Training Vessel	<u>R.O. 400,000</u>
Total Investment	R.O. 1,400,000
Annual running cost of school	R.O. 1,000,000
Annual operating costs of vessel	<u>R.O. 150,000</u>
Total annual operating costs	R.O. 1,150,000

Source: RDA Indicative Long-term Fisheries Development Plan.

Such a project would be heavily dependent on expatriates for instructors throughout the first phases of the program. Considerable time would be needed in the planning and the construction of an FTC. Furthermore, a serious study should be made to determine whether traditional fishermen from all areas of the country would be willing to participate in a FTC.

## 2. Socio-cultural studies

The resource pool for fishing operations in a fishery development project will include traditional fishermen who wish to upgrade their own fisheries technology, sons and daughters of fishermen who are interested in the fisheries sector, and newcomers to the fisheries sector. There is no guarantee that the traditional fishermen would attend a FTC for training. Such centers have been established in several countries (Mexico, Philippines etc.) and directed toward the traditional fishermen. They have failed as national centers because the traditional fishermen were not willing to spend large segments of time away from their families and communities. Some of them have become little more than very expensive regional vocational schools. Furthermore, the Omani fishermen are economically better off than fishermen in most developing countries. There may be too little evidence of economic/social gain to the fishermen for them to travel to an FTC for training. The last serious sociological study on Omani fishermen was done in 1979 (re-analyzed by Pollnac in 1984). Much has happened in the traditional fisheries since the last study. A new study should be done to determine the needs of the fishermen, what type of training they would like to see, their ideas on enforcement and management, etc. There are several anthropologists at SQU qualified to do such a research program.

## 3. Oman Technical & Industrial College

Many of the key informants are in agreement that the training of the sons and daughters of fishermen, among others, is important for fisheries development in Oman. They would provide a cadre of trained personnel who could be used in industry, government and research. It would be more cost effective if there were an existent infrastructure in Oman that could undertake technical training in fisheries. In that light it will be worthwhile to discuss OTIC and project support of its facilities and faculty.

OTIC was founded in 1984 under the Ministry of Social Affairs and Labor. It is a two year technical vocational college for training in commerce and technical disciplines.

### Commerce

Administration  
Office Management  
Secretarial  
Accounting

### Technical

Electronics  
Mechanics  
Computers  
Construction  
Laboratory Sciences

In 1987 OTIC graduated its first class (65 students) and last year (1987/88) they admitted 250 students. Some of their more recent graduates in laboratory sciences have been employed at MSFC. They were recommended highly by the staff at MSFC and two have received British Council scholarships to do further technical training in England. Ten of their students from each of the technical sections have the option of going to SQU and have done well in their studies. Because of the increasing numbers finishing secondary school, it has become much more competitive to enter the program. This September they accepted 250 students from a total of 800 applicants. The technical courses are all taught in English by an expatriate staff that includes British, Indian and Filipino professors. The URI consultant team spent four hours interviewing staff and visiting the facilities. They were impressed by several factors which include:

- 1) Willingness of the Director and staff to explore the possibility of including fishery programs in the technology division of the school.
- 2) In-place facilities and teaching labs such as: engine mechanics lab, hydraulics lab, electronic lab which can be up-graded with proper equipment for fisheries. An immaculate computer teaching lab with twenty IBM computers. Biology laboratories that were well-equipped and functioning. Available dormitory space exists for non-area students.

They have sent some of their students to MSFC for their six week internships from the laboratory sciences program. The Head of the biology section of laboratory science holds a Doctorate in Marine Sciences. He is enthusiastic about the possibility of a fisheries program at OTIC. They are expanding their facilities next year to double the student population to 1000 (500 each year) and will be adding on specialties in food science and petroleum engineering.

## V. Implementation

### A. Training Coordinator

Overall responsibility for the management of the training component will be undertaken by an in-country Training Coordinator/Manager based at the DGF. The individual selected should have the following minimum qualifications:

Masters degree in a fisheries or education related field with five years experience in training and exposure to USAID participant training regulations. The candidate must have two years developing country experience, preferably in an Arab culture, and a proven record of successful interaction with HCNs. Arabic language capability preferred. The position requires an ability to work within a complex framework of government sectors and to be capable of holding high level negotiations with Ministry officials.

The Training Load Chart illustrates an increasing training load over time with a levelling off at the end of the project. The Training Coordinator may feel that an assistant is required as the load becomes heavier in 1992-1993. The workload will be dependent on the number of individuals trained at the Technical College level in Oman. If that option is not made available, then a majority of the technical training will have to be undertaken in the U.S. and in third countries. That will substantially increase the pressure on the Coordinator and an assistant may be required.

### B. Assistant Training Coordinator

The Assistant should have the following minimum qualifications:

Masters degree with five years experience with USAID participant training programs. Familiarity with Handbook 10 regulations and at least two years developing country experience, preferably in an Arab culture. Arabic language capability preferred. The Assistant should serve at the request of the Coordinator with primary emphasis on completing the procedural work required for USAID participant training (selection, processing, monitoring and evaluation as per Handbook 10 regulations).

Whether an Assistant Training Coordinator becomes a 100%-time position should be determined by the Training Coordinator, in conjunction with the Chief of Party. During slack periods the assistant could work on project

paperwork tasks. A broader range of responsibilities must be explored should the Assistant not need 100% of her/his time to accomplish training responsibilities.

The Coordinator and Assistant Coordinator will be responsible for ensuring that all training falls within the guidelines set forth by Handbook 10. The administrative regulations associated with participant training should be understood where applicable by participants and DGF Directors. The Coordinator will strictly adhere to the regulations when undertaking any administrative management tasks associated with participant training.

### C. Management and Coordination

The Training Coordinator will undertake primary organizational/management and administrative responsibility for coordination of all training activities. Management of the training schedules will necessitate a well planned implementation table to assure that participants are staggered so as to limit disruption at the DGF. Of equal importance will be the Coordinator's role as liaison between different Ministries and as the organizational linchpin between the different actors involved in training. The Training Coordinator will assist in the organization of an interministerial committee composed of representatives from the Ministries of Education, Social Welfare and Labor and Agriculture and Fisheries. The first order of business would be to prepare an implementation plan for the eight year life of the project. From this generalized plan the committee would prepare a yearly implementation plan. The Coordinator would then utilize input from the committee to formulate the final annual implementation plan. The Coordinator would serve as the contact person for all of the different ministries and would only convene a committee meeting in the event that an issue could not be resolved through normal channels. In short, this translates as the in-house manager for all training: 1) Degree at the graduate and undergraduate levels; 2) Technical Degree two years; 3) Non-degree long and short term; and 4) Study Tours for Directors.

An effective training program will not only provide participants with an enhanced technical capability but will also instill a problem solving and analytical dimension to their thought processes. Training should vary between theoretical and practical/applied experiences. Equally important is that trainees' capabilities not be underestimated and that programs be designed to rigorously challenge each individual.

A weakness of past training attempts was reflected in the lack of a cohesive program planning. The effort lacked central coordination and was not integrated into the overall project objectives resulting in a training component that functioned independently of the other project activities. The inclusion of a Training Coordinator will result in a more centrally managed program with direct links to the other project components.

Specific program recommendations would include:

1. A coordinated training plan.
2. A uniform selection system.
3. An in-house testing system for basic science, math and English skills.
4. A formalized program for pre-departure orientation.
5. A systematic post evaluation effort.

#### D. Implementation of the U.S. Training Component

The coordination and planning for all long- and short-term training at the degree and non-degree level is the responsibility of the Training Coordinator who is to work alongside appropriate counterparts within the DGF. The TC will liaise regularly with the different Ministries in organizing the candidate selection and pre-departure activities. The TC will be the primary conduit for training information between all players in the fisheries sector.

The process begins with the TC tracking the nomination of participants from the appropriate Ministry and assisting in the nomination process. For private sector candidates, information regarding training opportunities should be disseminated through announcement in local publications and through informal contacts with business leaders through the Chamber of Commerce.

Once the nominees are confirmed, academic credentials and letters of reference must be assembled for those undertaking degree level study. This phase in the placement process can be painstaking and time consuming for the TC. The American placement process is usually unfamiliar to non-Americans and requirements which are important for obtaining university admission in the U.S. are not well understood by HCN's. To obtain the best available training (admittance to quality institutions) candidates should have dossiers that represent them in the best possible light. The TC must serve as an advisor to the nominating ministries to ensure that an

institutionalized capability will be created to direct future manpower training needs to U.S. institutions.

Once the nominees are identified their educational objectives should be carefully scrutinized to ensure that the training meets the overall objectives of the project. The candidate would then be required to take all of the prerequisite standardized tests (TOEFL, SAT, GRE etc.) and a complete file would be in hand for the TC who could then; initiate admission at several universities for each candidate (University of Miami, Oregon State University, University of Rhode Island, University Washington, Texas A&M for shrimp mariculture, University of Hawaii, and the University of Maryland). By involving several institutions in the early stages of the training design the most appropriate program can be offered to each candidate, which invariably results in the most suitable and comprehensive training experience.

#### E. Study Tours

The Study Tours for Directors will be conducted in the U.S. and will be front loaded over the first five years. The objective is to educate directors as to the functioning of a modern industrialized fishery as well as to allow them to clearly conceptualize the direction of the Oman fishery over the eight year period of the contract. The study tours will be arranged by the TC who might contract out to an institution that is familiar with the U.S. fishery (USDA, NMFS, NOAA, ICMRD etc.). The tours should reflect the nature of the work conducted by each Director and be designed specifically to correspond to that individual. The TC will be responsible for the design and implementation of each study tour and will work in conjunction with the Directors to ensure that everyone is in accord with the final product. Some of the Directors could benefit from a two week follow up training near the end of the project to examine where the Oman fishery should head after the year 1998.

#### F. Implementation of In-country training

In-country training will be conducted at the degree level (OTIC and SQU) and on a non-degree basis through short courses. Selection for the OTIC and SQU components is on a competitive basis managed by the Ministries of Social Affairs and Labor and Education respectively. The non-degree short courses will be organized by the TC and will require careful planning to avoid disruption of DGF daily operations.



1) Oman Technical and Industrial  
College (OTIC)

The Oman Technical and Industrial College presently offers vocational technical degrees equivalent to the U.S. Associate Degree in Arts and Science. The requirements for admittance include a high school degree and a grade point average in the upper 20% of the secondary school population.

The College has a well developed infrastructure with ample classroom and laboratory space as well as dormitory facilities for men and women. The College is divided into two separate units (commercial and technical). The Commerce component is conducted entirely in Arabic while the Technical component is conducted in English. The Technical department is divided into five focus areas; 1) Electronics 2) Mechanics 3) Computers 4) Construction 5) and Laboratory Sciences.

To initiate a Technical Fisheries and Fisheries Science program within the Technical Department the following conditions would need to be resolved:

1. Approval by the Government of Oman to utilize OTIC as a fisheries education facility.
2. The hiring of three new professors in Fisheries Science and Technology (four professors presently conducting laboratory science courses at OTIC would need to undertake some of the teaching load).
3. The electronics, engine, construction, refrigeration and hydraulics laboratories would have to be equipped with fisheries training gear.
4. A space within the present lab structure would be required to set up a fishery gear lab (for net design, trap design, etc.).
5. An arrangement with the DGF to allow OTIC to utilize the vessel would need to be arranged as well as the participation of technical assistants in teaching some of the courses.
6. In addition to lab equipment other educational material would be required including texts, and training equipment.

## 2) Sultan Qaboos University (SQU)

Sultan Qaboos University presently offers a B.S. major in both Fishery Science and Technology under the auspices of the college of Agriculture. Presently, there are eighteen students enrolled in Fisheries with an eventual maximum of forty as the system develops. The requirements for admittance include a high school degree and a grade point average in the upper 10% of the secondary school population.

To fully staff the Fisheries department will require the following technical assistance:

1. A commitment of at least two professors over the first two years of the project.

### G. In-Country Skills Training

The TC will have primary responsibility for managing and organizing the short course program. The courses should encompass a wide spectrum of administrative management and fisheries related topics, and be provided on an ongoing basis. A yearly training plan should be submitted that outlines the courses scheduled and the departments targeted for each session. Selection of courses will be undertaken in conjunction with approval of the Directors and could be conducted by faculty at OTIC, TA staff from the project or through special hire of technical experts. The latter would be the least cost efficient and should be avoided if possible. A strong effort should be made to identify at least one individual from the DGF who would work with the training group as "trainer's assistant" to observe the training methodologies employed and to master the planning and other management tools presented in these courses. The content and the process should be institutionalized as part of the transfer of knowledge.

OTIC presently conducts day release and evening programs for the Ministry of Environment. They have expressed a willingness to institute the same type of arrangement in fisheries should the Government express an interest in creating a fisheries track. The process of continuing education should be treated as a function of personnel management and the concept incorporated into DGF planning activities. The TC should train a counterpart to institutionalize an adult education component sponsored by the ministry.

## H. Third Country Training

Simultaneous with the in-country skills training the TC will be developing options for third country training. Travel to selected institutions in Tunisia, Morocco, and Egypt would add to the information bank already collected by Checchi and Company and RDA.

The issues surrounding the question of third country training merit special attention. Perhaps more than with U.S. based training, third country placement relies on the ability of the TC to develop distant personal support systems. Both the placement phase and the support and monitoring phases depend on a thorough understanding of educational institutions in North Africa. The most challenging task to be performed regarding the placement of trainees in third country institutions is gathering current and reliable information. The TC will have to develop a responsive network and complete knowledge of the institutions before making any recommendations for training. The TC should also seek the assistance of other organizations involved with training (World Bank, IMF, UNDP, USIS, etc.).

There are many advantages which accrue to effective participant training programs at third country institutions. The challenge to the TC will be selecting institutions and implementing the program. Careful consideration should be made to ensure that the training can be conducted in Arabic and that documentation is also in Arabic rather than in French, since the third country option is language dependent.

## I. Monitoring and Evaluation

This program support task involves two different functions. Monitoring requires a mechanism which will facilitate regular contact between the TC and each participant while evaluation requires analysis, interpretation and judgement with respect to the information gathered through the monitoring process.

As the term "monitoring" implies, it is the TC's responsibility to keep informed of the extent and nature of participant progress. Depending on the type of training this activity will take different forms. For U.S. based degree training the TC will maintain a record through academic advisors and information from project backstoppers. Funds should be included for campus visits and reports completed on a semester basis. The monitoring of in-country training should be performed from beginning to end. The TC will assist in the design of the courses

and will therefore have input into changes after evaluation.. Interviews should be conducted with each participant during the actual course period for immediate feedback and post training interviews conducted for design of future courses. The study tours will have fairly fluid schedules and will be designed to be responsive to the Directors' needs. Interviews with each returning Director will aid in the design of the following study tour.

For students attending third country training institutions, the counselling support and monitoring will differ from the other groups. The TC may have to make site inspections to offer counselling and monitoring support or, if possible, utilize the Training Officer at the USAID mission in question as a point of contact.

The information gained about a participant's progress through the monitoring process must be interpreted and evaluated. The most straightforward indication of a participant's standing will be through information collected by the TC from academic advisors and trainers. This information will need to be interpreted and answers to the following questions will need to be found if an accurate evaluation is to be made.

Does the participant seem to be performing satisfactorily or improving his/her performance over time?

Is poor performance the result of (a) training being too difficult given the level of preparation of the participant (b) insufficient study and effort by the participant (c) non-academic factors (cultural, social, or emotional adjustment)?

Is outstanding performance the function of (a) diligent study, (b) courses offered at too low a level, (c) other factors?

The TC will have overall management responsibility for the implementation of the training component. Implementation will encompass coordination of the different types of training (degree, skill, study tour) as well as identifying the appropriate sites (U.S., third country, in-country). The organizational issues that this individual will face include; (a) design of a selection process for ensuring participation of quality trainees; (b) selection of quality institutions and individuals to assure high level training; (c) design of an effective evaluation and monitoring system that is responsive to participants and to institutional needs. As the implementor of a training component that is intended to introduce changes in the ways people and organizations

behave and work, the TC must begin his/her assignment with a period of trust and consensus building. Time must be spent analyzing bureaucratic, institutional, and interpersonal relationships and an effort made not to exert directive leadership without structuring the development of this capacity among affected officials.

The TC will also maintain contacts with the other international donors (Great Britain, Japan and South Korea) to avoid duplication of effort and to coordinate training plans among the donors. At this time there seems to be no duplication of effort or programs at cross purposes with the proposed U.S. training agenda.

Because of the fluidity of fisheries development in Oman the training program must be flexible enough to meet changing manpower requirements. It is essential that the evaluations focus on recommendations and means for facilitating the training program to meet the changing needs in the fisheries sector. These needs should be assessed annually by the TC and technical staff.

J. Implementation Plan Year 1-3.

<u>Tasks</u>	<u>Year 1</u>	<u>Time Frame in Months</u>
1) Training Coordinator (TC) organizes office - identifies counterpart and clerical staff.		2
2) Assist OTIC personnel in identifying needs for creation of Fisheries Tech/Science Departments. Explore possibility of using OTIC staff in the Laboratory Sciences for Skill Training Courses.		2
3) TC designs and reviews year 1 training plan with Ministry officials.		3
4) After training plan approval, TC identifies 5 B.S./B.A. candidates within DGF for U.S. training. - Selection Credentials  High School Diploma TOEFL test score results SAT test score Translated high school transcripts Approval for training by Ministry, COP, TC and Joint Commission.		4
5) Identification of 5 Masters Degree candidates for U.S. training. - Selection Requirements  B.A./B.S. degree A record indicating capability to work at the graduate level TOEFL test score GRE test score High school and undergraduate school transcripts in English Approval of candidates by Ministry, COP, TC and Joint Commission		4
6) Identification of one Ph.D. candidate for U.S. training. - Selection Requirements  M.S./M.A. degree An academic record demonstrating strong research capability Ability to be accepted into a Ph.D. program in the U.S.		4

- |   |    |
|---|----|
| 7) Establish mechanism with Sultan Qaboos University to utilize qualified Technical Assistants as visiting professors on a one semester basis.                                    | 7  |
| 8) Organize 2 study tours for Directors; one for month 8 the other for month 10, preferably over the summer.  | 6  |
| 9) Design skill training program with TA and OTIC staff participation. Determine outside consulting needs.  |    |
| 10) First Study Tour begins.  | 8  |
| 11) Ten DGF/SQU/private sector officials selected for U.S./third country training.<br>- Selection Criteria  | 8  |
| <p style="margin-left: 40px;">ALIGU test scores in accord with Handbook 10 regulations</p> <p style="margin-left: 40px;">Approval from COP, TA, Ministry and Joint Commission</p> |    |
| 12) Second Study Tour begins.   | 11 |
| 13) Ph.D. candidate accepted.   | 8  |

#### Year 2

- |   |   |
|---|---|
| 1) 5 B.S./B.A. candidates accepted for fall semester (some may require additional English).<br>5 M.S./M.A. candidates accepted into U.S. programs<br>Ph.D. candidate accepted into program. | 1 |
| 2) 5 B.S./B.A. candidates proposed for U.S. based training.<br>5 M.S./M.A. candidates and 1 Ph.D. candidate proposed for study in the U.S.  | 1 |
| 3) First skill training for DGF advertised so that private sector candidates can participate on a first come first serve basis.   | 1 |
| 4) U.S. non-degree training candidates depart.  | 2 |
| 5) Two skill training programs prepared for months 8 and 12.  | 3 |
| 6) Two study tours designed for months 6 - 9.   | 3 |
| 7) Selection of 10 participants for U.S./third country non-degree training.   | 4 |

8) Study Tour.	6
9) Skill Training.	8
10) Study Tour.	9
11) Design of study tour for month 4 of year 3	10
12) Ph.D. candidate accepted.	8
13) Skill Training	12

### Year 3

1) 5 B.S./B.A. candidates accepted into U.S. universities.	2
5 M.S./M.M.A. candidates accepted into U.S. universities.	
2) 5 B.A./B.S. candidates proposed 5 M.S./M.M.A. candidates proposed 1 Ph.D. candidates proposed.	2
3) Selection of candidates for U.S. and third country non-degree training.	3
4) Two study tours designed for months 9 and year 4 month 2.	3
5) Design of three skill trainings month 6-11 and year 4 month 1.	3
6) Non-degree trainees leave for U.S. and third country destinations.	4
7) Study Tour.	4
8) Skill Training.	6
9) Study Tour.	9
10) Skill Training.	11
11) Assist with start-up tasks of Fish Tech/Science program at OTIC.	10
12) Ph.D. candidates accepted into U.S. universities.	8



Table 7. THREE YEAR SUMMARY PLAN

Department	Resource Pool	1990		1991		1992	
		Start	End	Start	End	Start	End
DGF							
1) MUSCAT							
Ph.D.							
M.S./M.M.A.	SQU and			1	1993	1	1994
	outside pool						
	staff and			3	1995	3	1996
	outside pool						
	staff and			8	1993	8	1994
	outside pool						
	(secondary grads)						
skill	staff			10	d.r.	10	int.
study tours	staff	2	2 mos	1	2 mos	1	2 mos
2) SALALAH							
Ph.D.							
M.S./M.M.A.	SQU and			1	1993	1	1994
	outside pool						
B.S./B.A.	staff and			1	1995	1	1996
	outside pool						
2 yr tech	staff and						
	outside pool			4	1993	4	1994
	(secondary grads)						
skill	staff			5	int.		
study tours	staff			1	2 mos		
3) MSFC							
Ph.D.	MSFC staff and						
	outside pool	1	1993			1	1995
M.S./M.M.A.	MSFC staff and SQU			2	1993	2	1994
B.S./B.A.	MSFC staff			1	1995	1	1996
2 yr tech	outside pool			4	1993	4	1994
	(secondary grads)						
skill	staff					10	d.r.
study tours						1	2 mos
4) SQU							
Ph.D.	outside pool			1	1994	1	1994
M.S./M.M.A.	SQU			1	1993	1	1994
B.S.				2	1993	2	1994
2 yr tech							
5) BANKS/PRIVATE							
2 yr tech	staff			2	1993	2	1994
study tour	staff					1	2 mos

Table. 8. TECHNICAL ASSISTANCE MAN MONTH REQUIREMENTS

	SQU	OTIC	In-Country Skill Trg	Training Coordinator	Asst. Training Cord	Home Off Support
	two people first two years					
Total MM	<u>48 MM</u>					
		two people first two years				
Total MM		<u>48 MM</u>				
			six months over eight years			
		Total MM	<u>48 MM</u>			
				<u>eight years</u>		
			Total MM	<u>96 MM</u>		
					<u>4 years</u>	
				Total MM	<u>48 MM</u>	
						1 - 5 <u>people</u>
					Total MM	<u>144 MM</u>
						Total MM for project 36 man years

Table. 9. TOTAL TRAINING YEARS AT DEGREE/NON-DEGREE LEVEL

U.S. B.S./B.A.	U.S. M.S./M.A.	U.S. PH.D.	U.S. Technical	Third Country
15 B.S. candidates over first 3 years				
60 years				
	34 over 8 years			
Total	68 years			
		8 over 8 years		
	Total	24 years		
			10 per/year first 3 years	
		Total	60 years	
				10 per/year first 3 years
			Total	60 years
				Total Training Years 272

Table 10. TRAINING MONTHS

MM = Man Months  
P = Participants

	1990		1991		1992		1993		1994		1995		1996		1997	
	MM	P	MM	P	MM	P	MM	P	MM	P	MM	P	MM	P	MM	P
B.A./B.S.			60	5	120	10	180	15	180	15	120	10	60	5		
M.S./M.M.A.			60	5	120	10	120	10	120	10	144	12	168	14	84	7
Ph.D.	12	1	24	2	36	3	36	3	48	4	60	5	48	4	24	2
Non-Degree U.S.			120	10	240	20	240	20	120	10						
Third Country			120	10	240	20	240	20	120	10						
Study Tour	2	1	4	2	4	2	6	3								

Table 11. Degree Training Options

	B.S./B.A.	M.S./M.M.A.	Ph.D.
Fisheries Science	URI OSC U. Washington U. Miami U. Hawaii	URI OSU U. Washington U. Miami U. Hawaii	URI OSU U. Washington U. Hawaii U. Miami
Fisheries Biology	U. Maryland U. Delaware Humbolt U. Texas A & M	U. Maryland U. Delaware Humbolt U. Texas A & M	U. Maryland U. Delaware Humbolt U.
Marine Affairs	URI U. Washington	URI U. Washington OSU	
Fisheries Economics Marketing	URI OSU U. Delaware	URI OSU U. Delaware	URI OSU
Seafood Technology	OSU U. Washington URI	OSU U. Washington URI	OSU U. Washington URI
Marine Biology Oceanography	URI OSU U. Washington U. Miami U. Maryland U. Hawaii	URI OSU U. Washington U. Miami U. Maryland U. Hawaii	URI OSU U. Washington U. Miami U. Maryland U. Hawaii

## Two Year Technical Training Option

Fish Tech/Fish Sci	Computer	Trade	Admin
OTIC	OTIC	OTIC	OTIC
URI	URI	URI	URI
Third Country	Tunisia	Tunisia	
Tunisia	Humberside	numerous community	
Humberside	numerous	colleges in U.S.	
	community		
Clapsop Community	colleges in		
College, Oregon	U.S.		

Figure 11

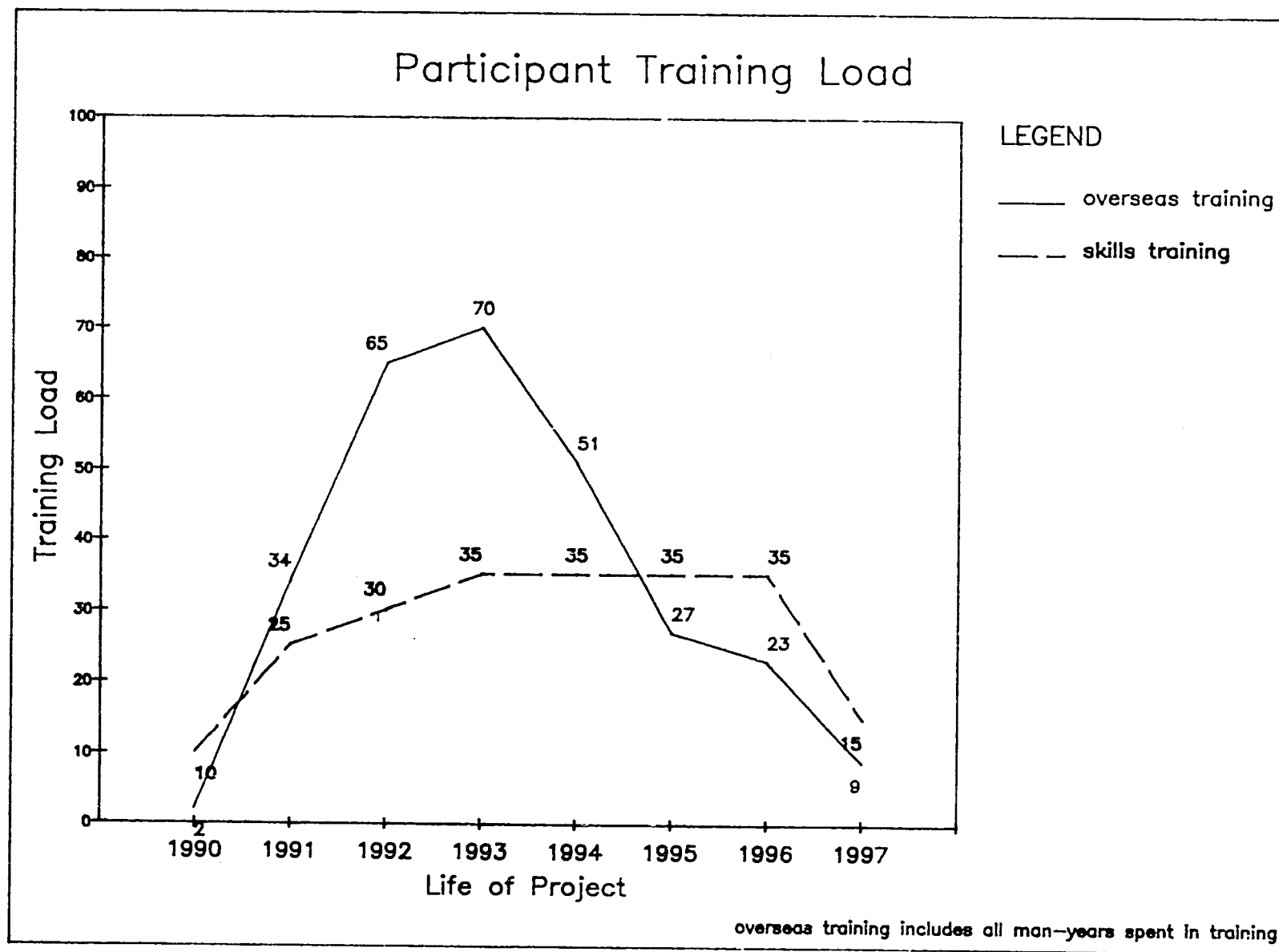


Figure 12.

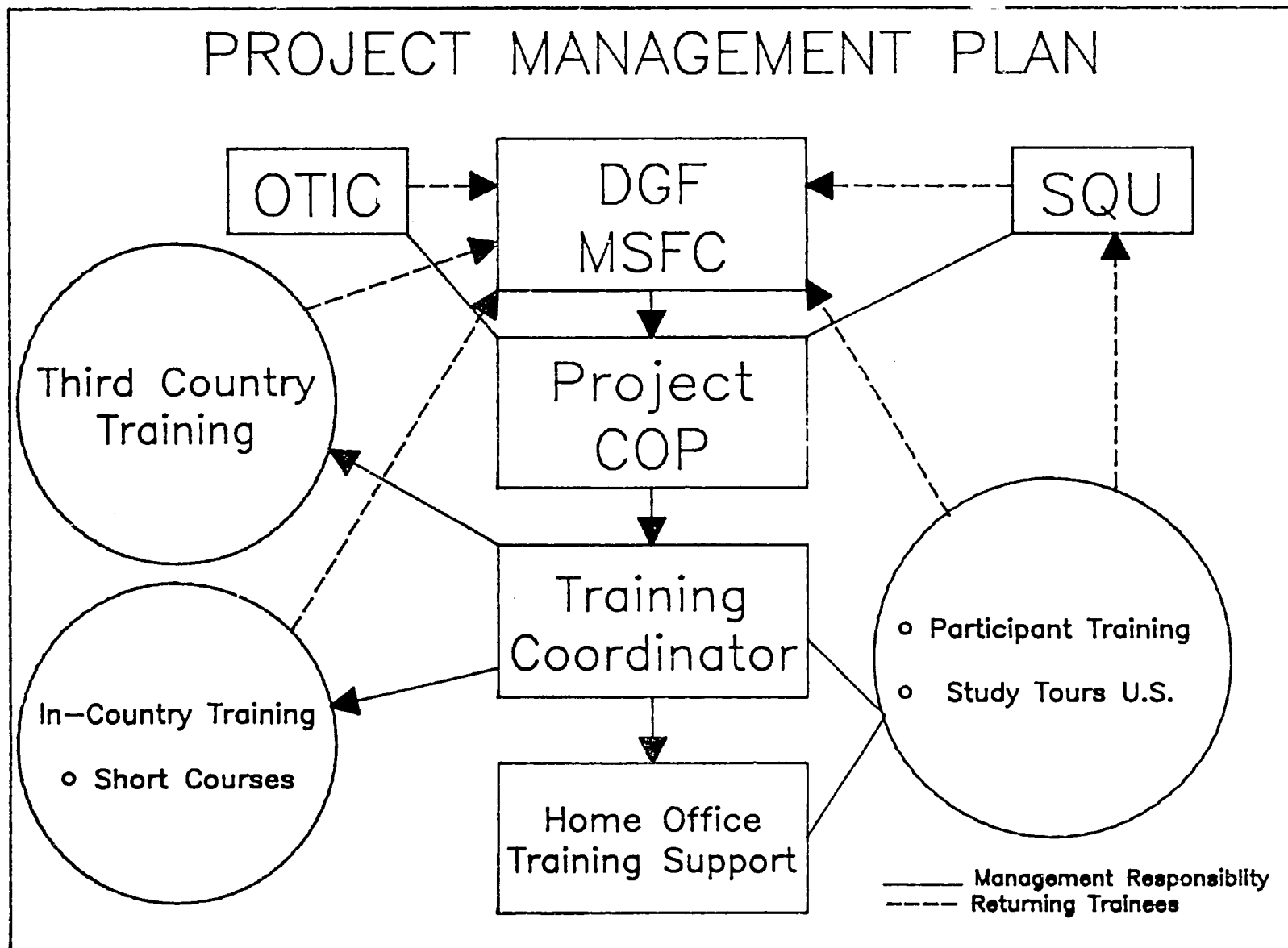
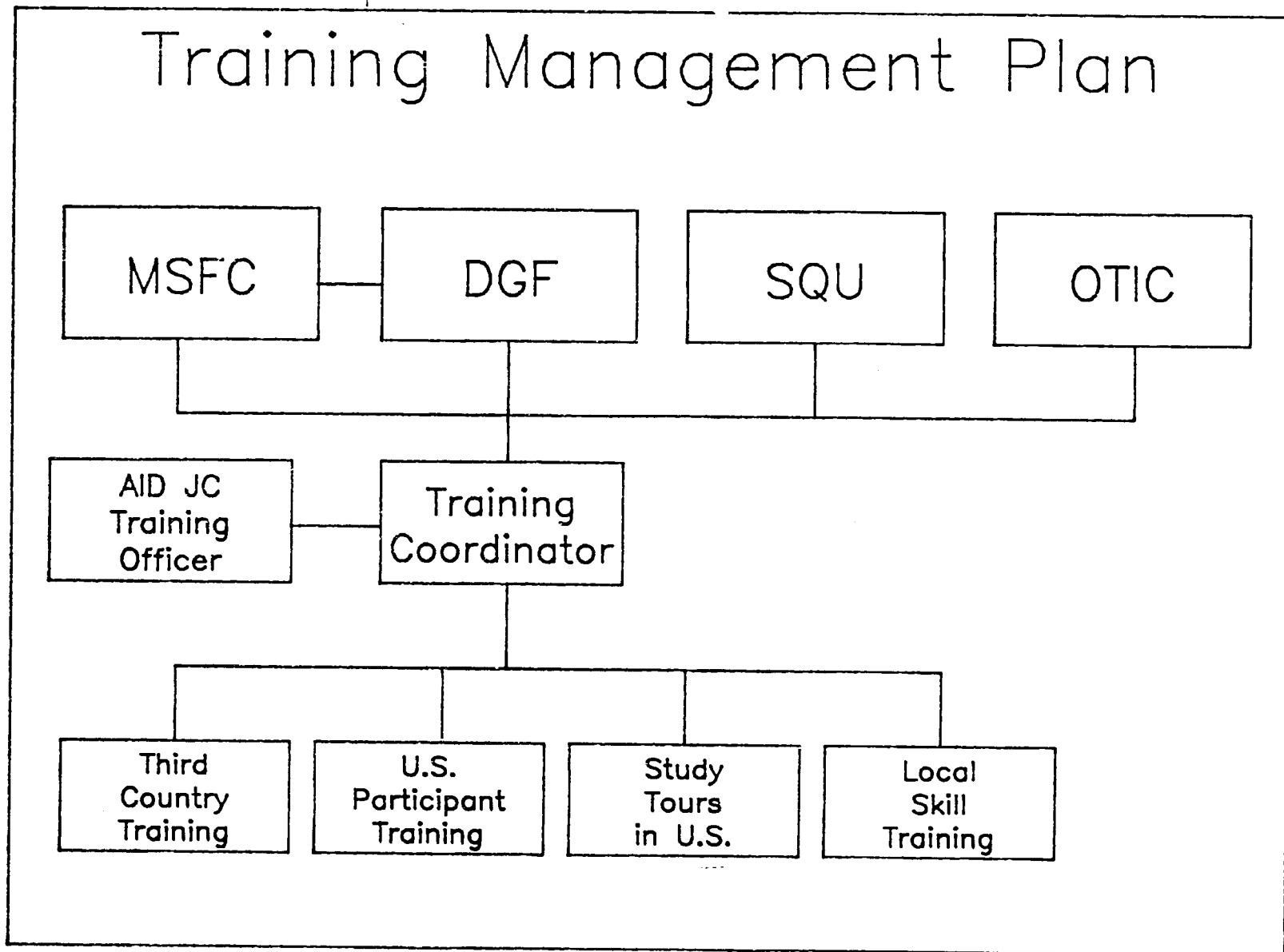


Figure 13.





## VI. Recommendations

A. Support for Sultan Qaboos University should be one of the first priorities of the project and should be undertaken in the form of funding for visiting professors.

1. Two professors for each of the first two years of the project are to be identified by project staff to alleviate the present manpower shortage.
2. Flexibility should be negotiated into the project contract to allow qualified staff to teach at the university (one course per year).

B. The Oman Technical and Industrial College should develop a Fisheries Technology and Science component to accelerate the Omanization of the sector. Assistance will be required to:

1. Develop a plan to convert present infrastructure into fisheries specific classroom space (a short term consultancy).
2. Provide TA support for the first two years by bolstering the department with two additional faculty.
3. Flexibility should be negotiated into the project contract to allow TA's to teach one course per year on a visiting professor basis.

C. In the event that a Fisheries Training Center is created support should be in the form of:

1. A socio-anthropological needs assessment of the traditional fishermen should be conducted to determine actual training requirements to be undertaken at the Center.
2. Support should be given for any extension courses conducted on the "Training of Trainers" (TOT).

E. Flexibility in the Utilization of Technical Assistants should be negotiated at the inception of the program and include the following provisions:

1. TA's, when requested and if qualified, should assist in the institutional development of SQU by teaching one course per year.

2. TA's should assist the training coordinator design and implement at least one skill training course a year. The TA should include one of his counterparts in both the design and implementation of the course.
3. In the event that a Fisheries Science and Technology program is instituted at OTIC, the TA's should be required to teach one course per year.

#### F. Training

1. U.S. Degree training at the B.S./B.A. level should be allowed on a limited basis to reward DGF staff members who have performed well and who may have the capability to undertake graduate work but do not meet the strict requirements of the SQU entrance system.
  - a) Five candidates a year for the first three years should be selected for U.S. based degree training.
2. Since no institutions presently exist to conduct training at the graduate level (M.S./M.M.A. and Ph.D.), programs should be conducted in the U.S. over the life of the project.

G. Technical training at OTIC could not reasonably begin until 1992. Until that time skill training should be carried out in the U.S. and if possible in third countries.

- a) Training for ten participants each year for three years at U.S. based institutions.
- b) Training for ten participants each year for three years at third country institutions.
- c) Total out of country training from one and two above would be for sixty individuals.

H. Skill training should be conducted through day release, evening courses or intensive one and two week intensive seminars.

- 1) The design and implementation of skill training course should be undertaken by the Training Coordinator in conjunction with TA and OTIC staff and if necessary outside technical and training experts.

I. The observer/enforcement program should be structured under the assumption that DGF officials will serve on Royal Oman Police boats and on Oman Navy and Coast Guard vessels.

1. The observer would be trained for two years in fisheries technology and would receive an additional month of specialized training on enforcement regulations.

J. Study Tours Will be designed specifically for each participating director.

- 1) The study tours will be front loaded and will not exceed two months.
- 2) An additional one to two week tour may be offered as a follow up near the end of the project.

K. Individuals from the private sector should be allowed on a first come first serve basis to attend the skill training courses.

1. Fishermen will receive training through extension services.
2. Once policy decisions on the licensing of larger vessels is clarified then an assessment of the private sector needs should be made.

L. The Chief of Party will encourage the training and placement of women at all levels of fisheries support activities. The participation of women in the laboratory science field needs to be expanded to the areas of research and management. This may be facilitated by hiring U.S. female Technical Assistant(s) and assigning Oman female counterpart(s).

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Mr. Hussain al-Khabouri  
Mr. Hamed al-Ghailani  
Mr. Hamid Dhaman  
Mr. David Evans

RDA International, Inc.

Mr. Kenneth Craib  
Mr. Keith Simmons  
Dr. Stanley Sverdloff  
Mr. Robert E. McClure  
Mr. Elie Moussalli  
Mr. Mahmoud Bouhleh  
Mr. Buck Custer  
Mr. Bob Tombari  
Mr. Palmi Ingvarsson

Marine Science and Fisheries Center

Dr. Richard Dudley  
Dr. John Hoover  
Dr. Don Johnson  
Mr. Jonathon Mee  
Dr. John A. Dorr  
Dr. Ken Hildebrand  
Staff - Research Assistants

Sultan Qaboss University

Dean Lee Hogan  
Dr. Jackson Davis

Oman Technical and Industrial College

Director Khalil Hassan Hassoun  
Mr. Bryan Robert Hornett, Head Science Laboratories  
Dr. Fazal Oman Quraishi  
Staff - Computer Department  
- Mechanics  
- Laboratory Sciences  
- Construction Engineering

### Private Sector

Mr. Phil Roberts - Protein Products  
Mr. Gert Christiansen - United Gulf Fisheries Co.  
Representative of Oman National Fisheries Co.  
Mr. Khami al-Riyami - National Bank of Agriculture  
and Fisheries

### Organizations

Checchi and Co.  
Mr. Lance Lindabury

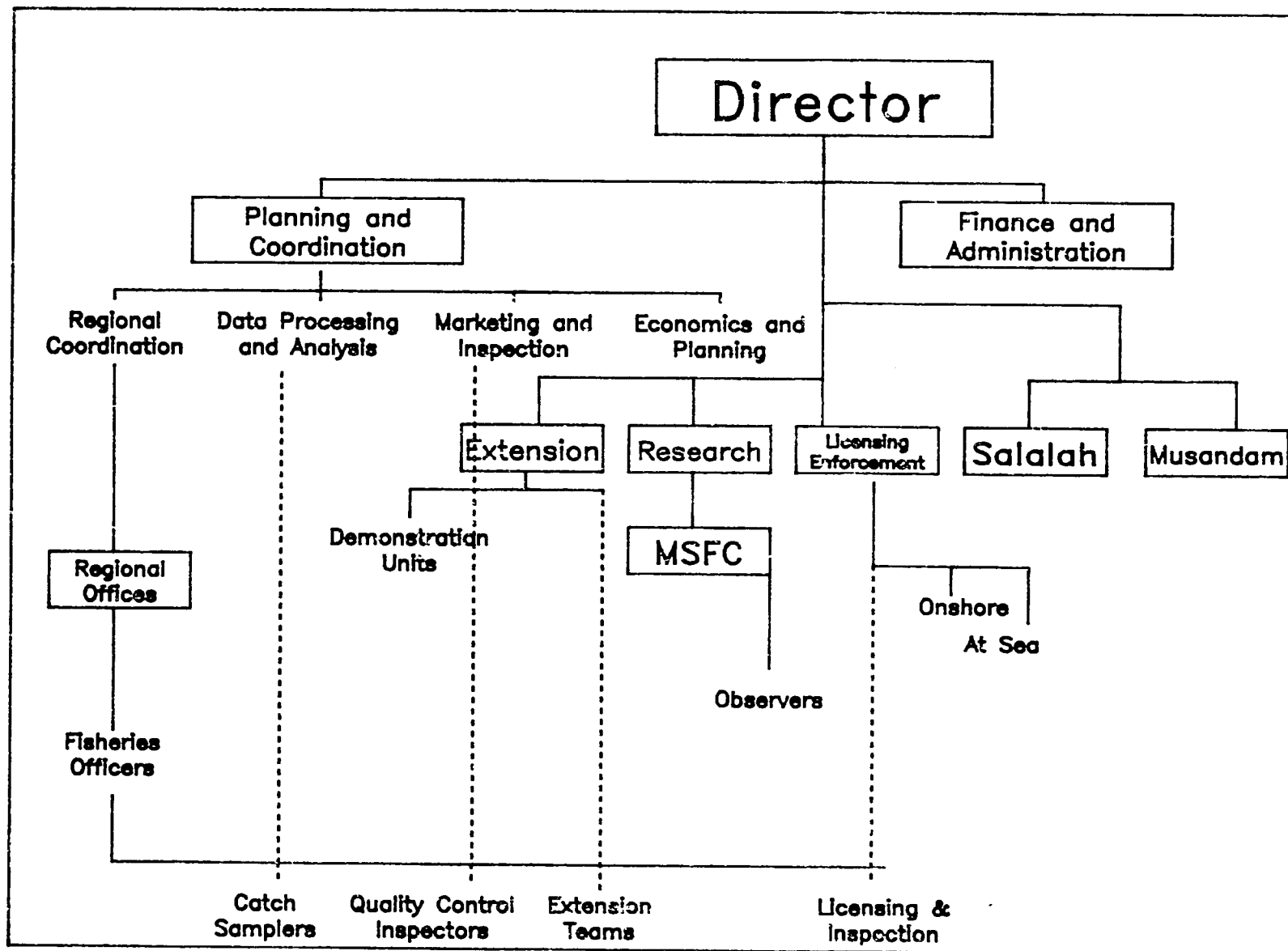
The British Council  
Dr. Penny Aspden

U.S. Agency for International Development  
Dr. Richard Neal

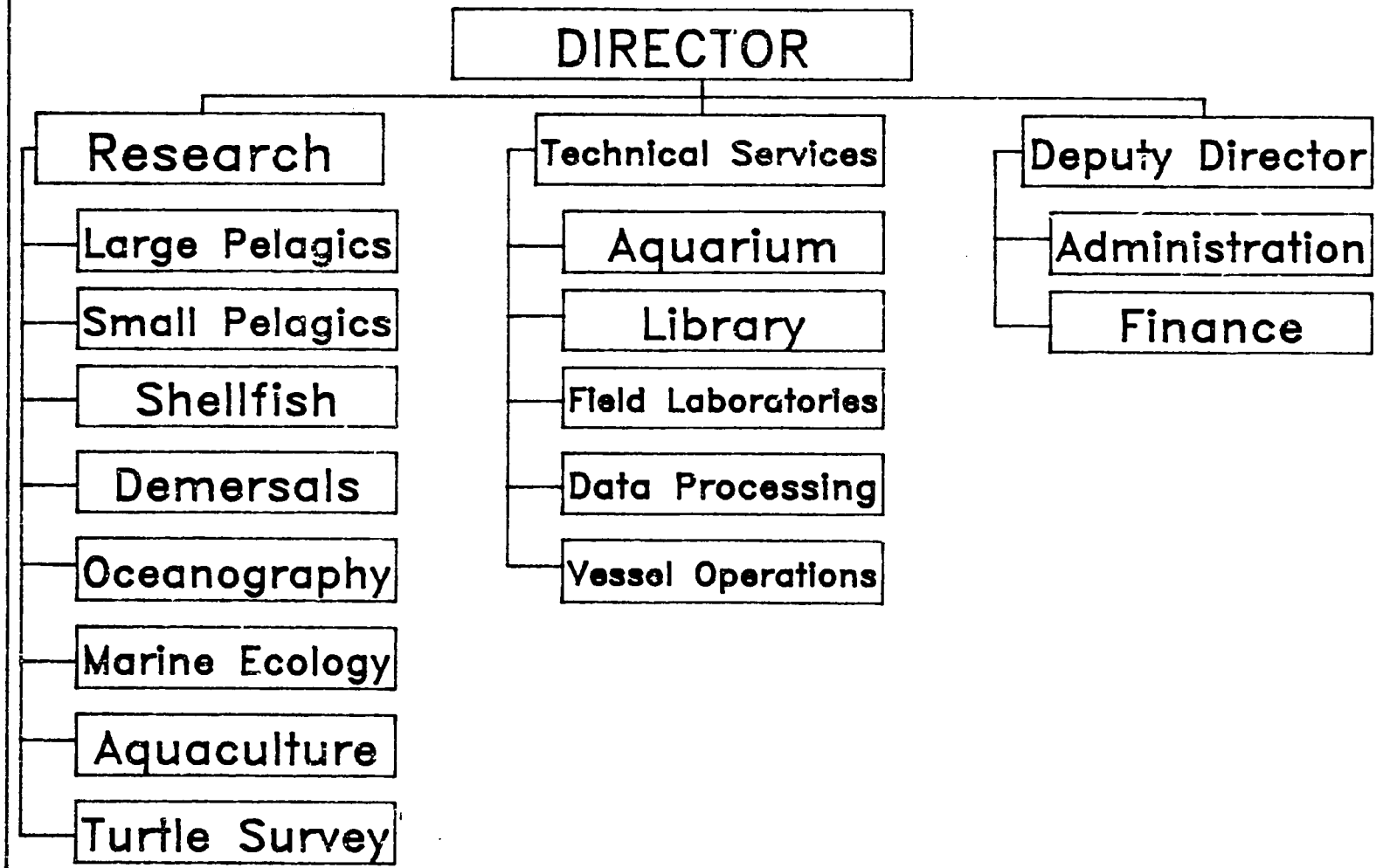
Omani-American Joint Commission  
Mr. Duncan Miller  
Mr. Merl Baker  
Mr. Stan Stalla  
Ms. Bridgett McKinney

## Appendix

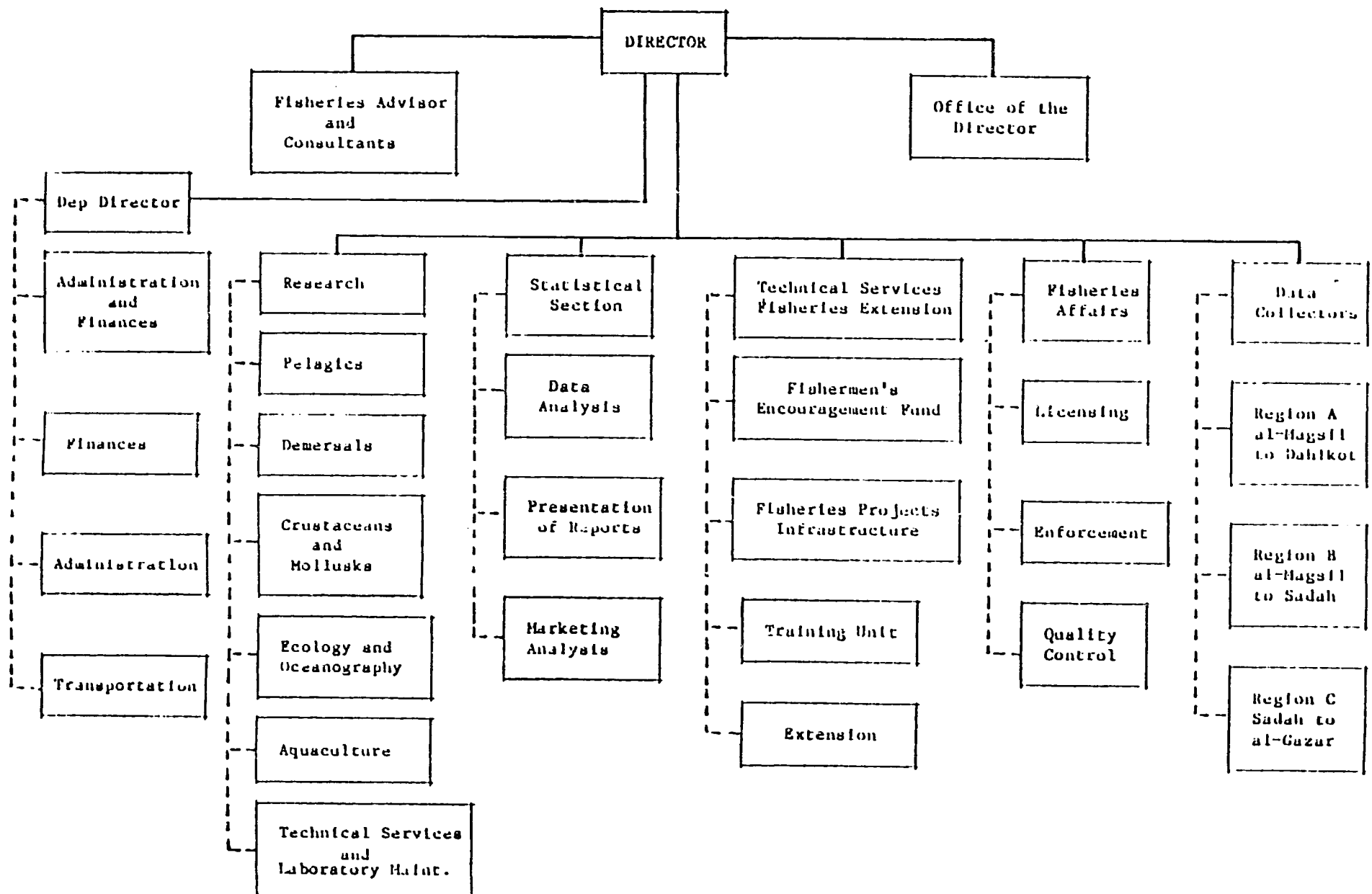




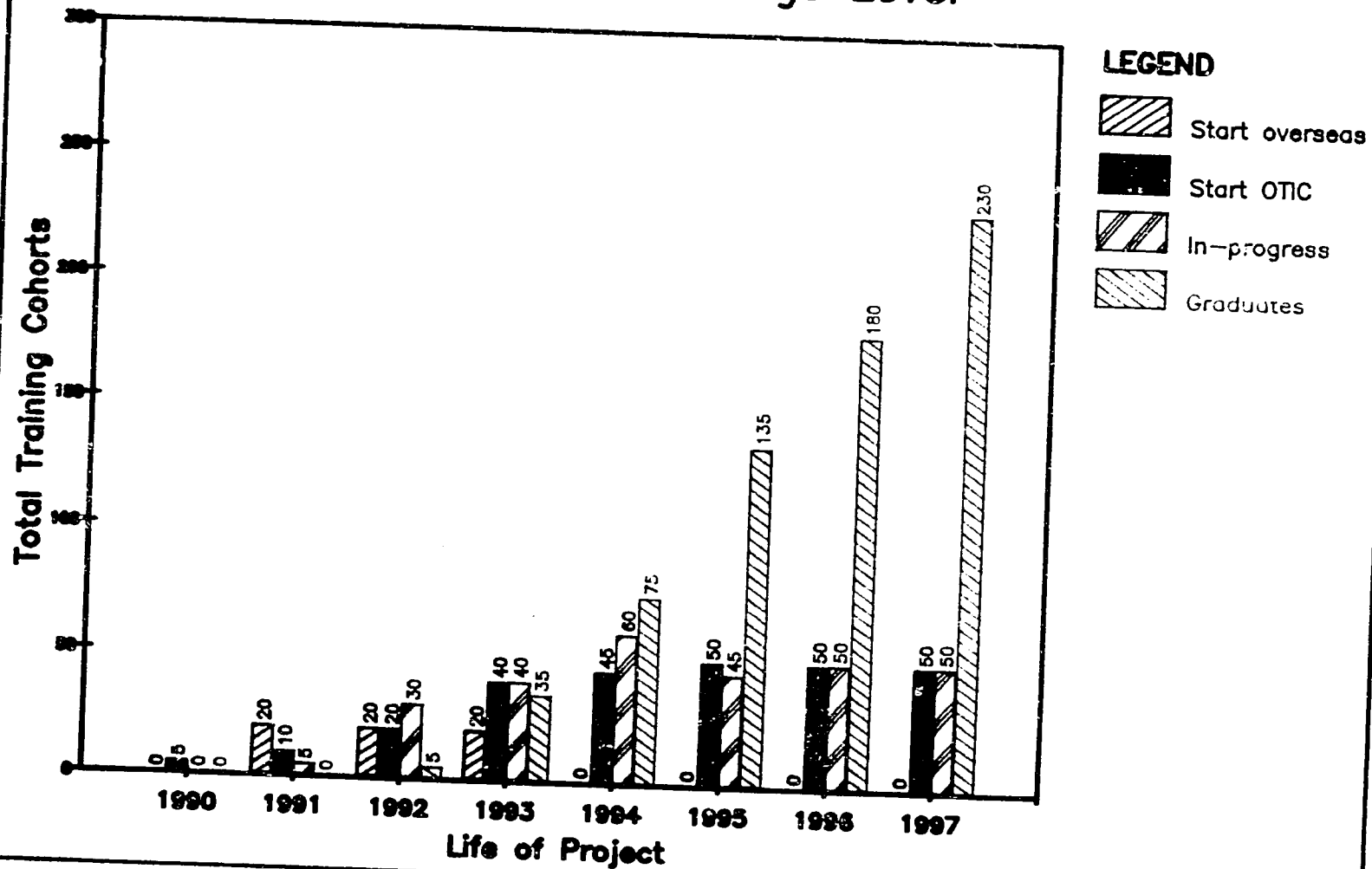
# Marine Science and Fisheries Research Center



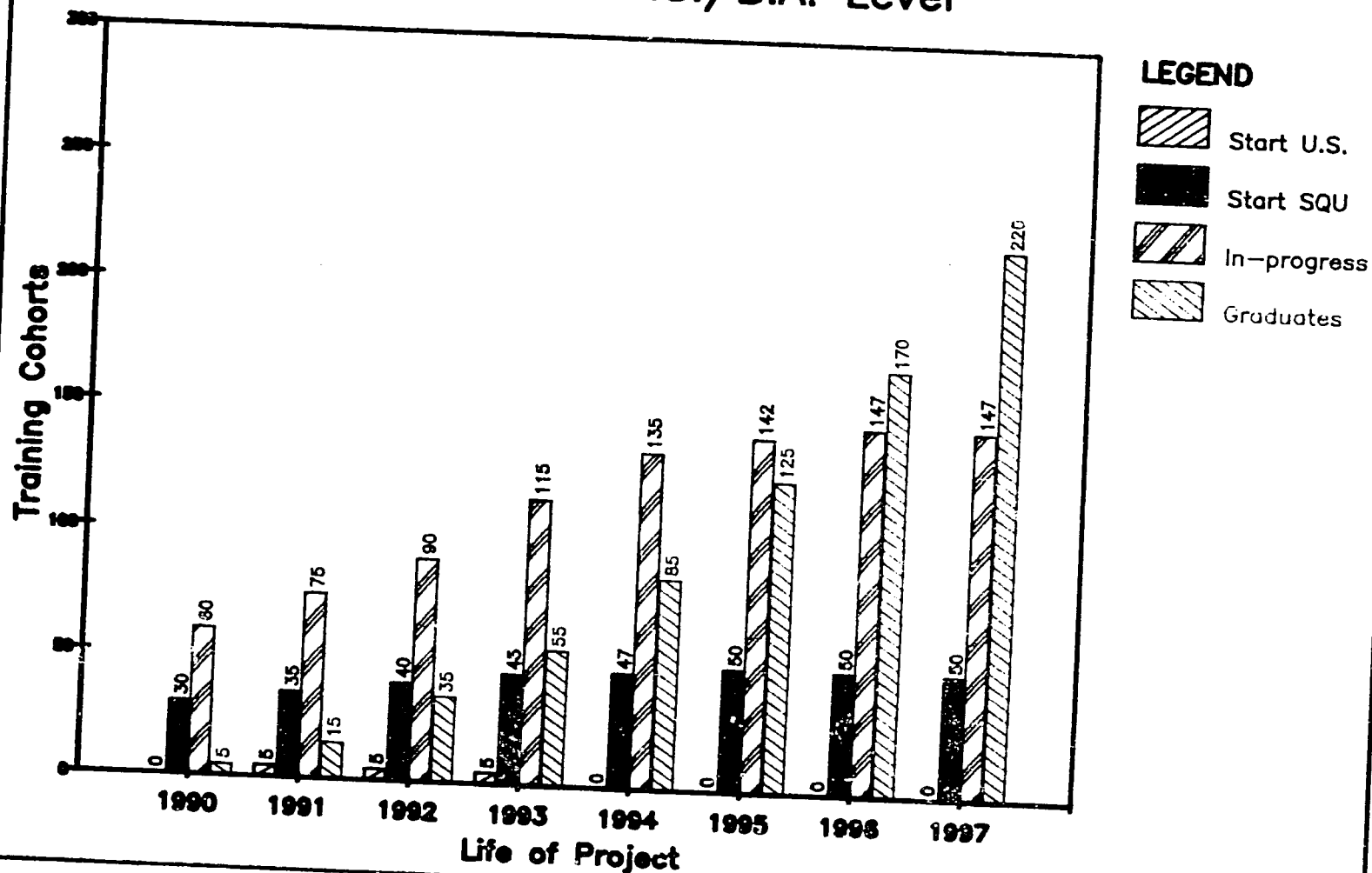
# Organization Chart DGF -- Salalah



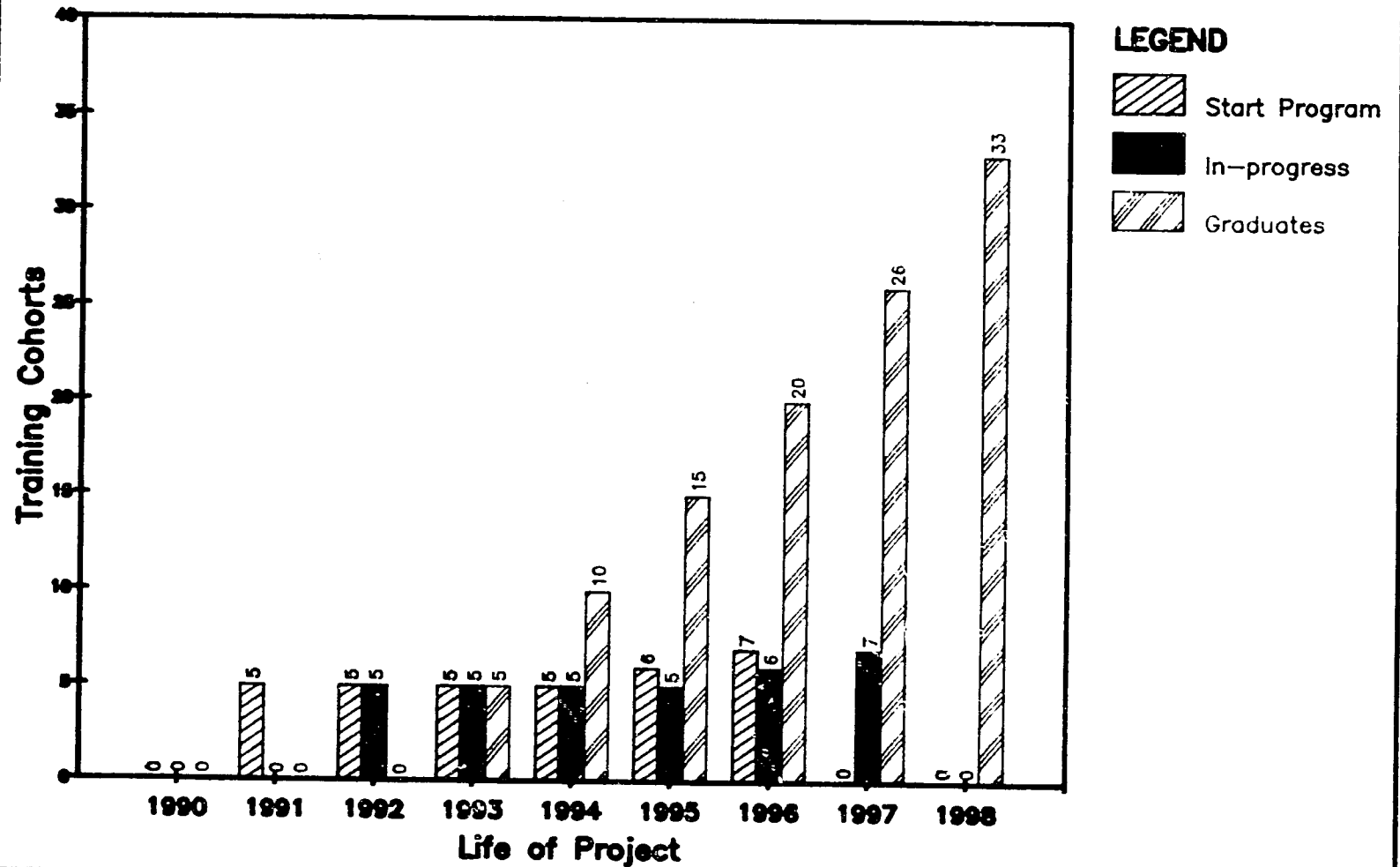
## Training at the Technical College Level



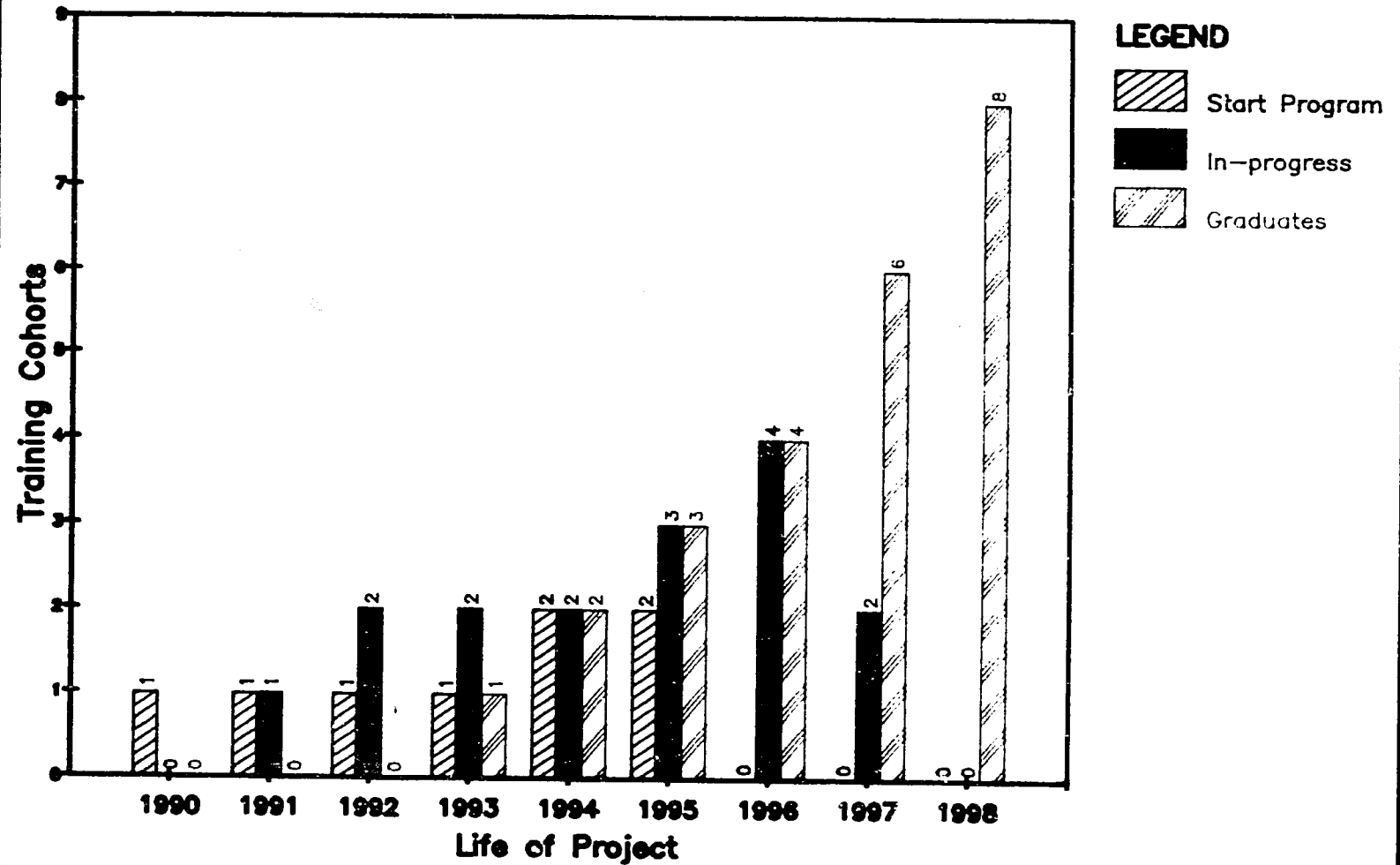
## Degree Training at the B.S./B.A. Level



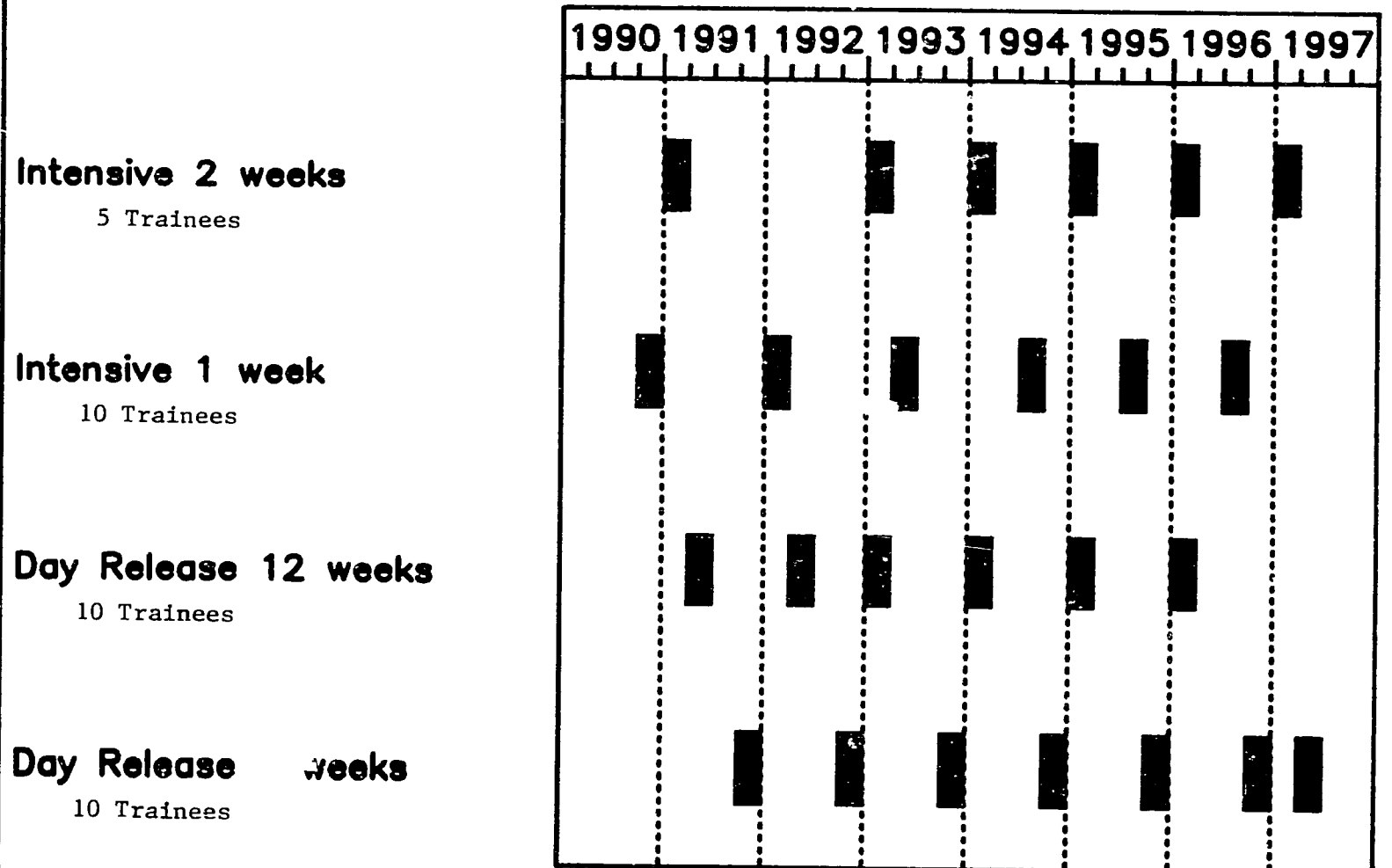
## Degree Training at the M.S./M.M.A. Level



## Degree Training at the Ph.D. Level

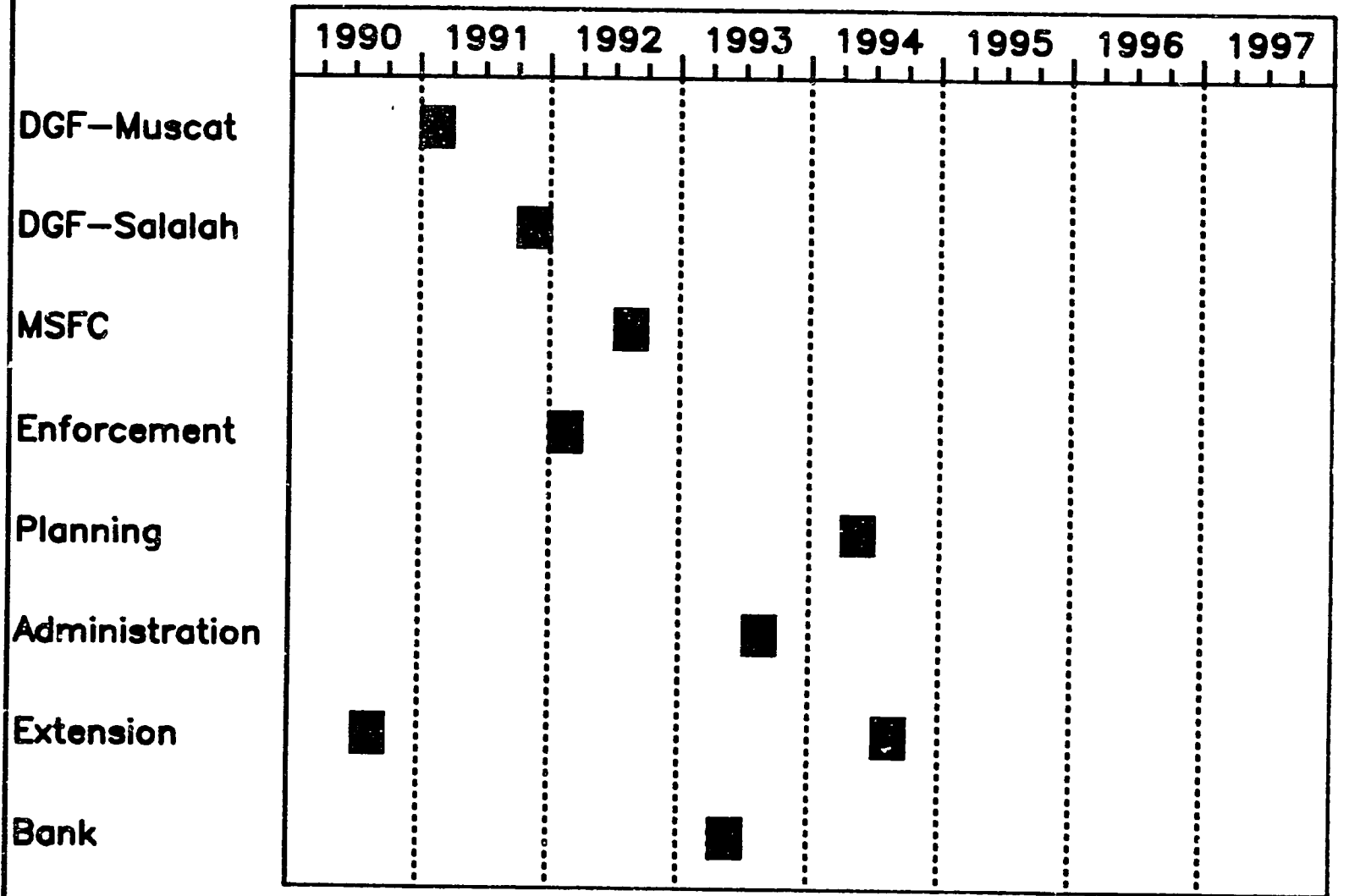


# IN-COUNTRY TRAINING REQUIREMENTS SKILL TRAINING





# STUDY TOUR FOR DIRECTORS



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