Evaluation Report 4.82

Fisheries Research Vessel
«Dr. Fridtjof Nansen» —
FAO/UNDP/NORAD

NORAD

EVALUATION REPORT OF THE SURVEY PROGRAMME AND OPERATIONS OF THE RESEARCH VESSEL "DR. FRIDTJOF NANSEN"

A FAO/UNDP/NORAD PROJECT

Prepared by:
A. Hallenstvedt
R. W. Ellis
C. E. P. Watson

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EVALUATION REPORT OF THE SURVEY PROGRAMME AND OPERATIONS OF THE RESEARCH VESSEL "DR. FRIDTJOF NANSEN"

(i) FOREWORD AND ACKNOWLEDGEMENTS.

Following the appointment of an evaluation mission by NORAD with FAO's agreement, in October 1982 to study the manner in which the R/V "Dr. F.N." surveys have been implemented and their impact in particular on fisheries development and management in the numerous countries where the vessel has operated, the report which follows contains the evaluation findings, based on field studies in a number og the countries concerned and supplementary information supplied by them in writing.

The opportunity is taken to express the teams appreciation of the friendly reception and frank views received from the very many officials, researchers and industry representatives who were consulted during the field visits, and the ready assistance given also by UNDP/FAO and NORAD staff in the countries concerned. The team is also greatly obligated to the many officials, scientists and others from countries that could not be visited in the time available, but who nevertheless responded to requests for their opinion in writing.

Details of people consulted during the study or who submitted their views in writing are shown in Appendices.

(ii) CONTENTS.

(iii) SUMMARY.

b. Project background

An agreement was signed in September 1971 between the Food and Agricultural Organization of the United Nations (FAO) and the Norwegian Agency for International Development (NORAD), providing for the construction of a fishery research vessel to undertake a 15 year jointly funded programme of scientific and exploratory investigations of the fishery resources of developing countries. The principal aim of the agreement was to assist recipient countries to develop their fishing industries by providing them with the essential basic data which they lacked, on the abundance, distribution and seasonality of their fish resources.

In partial fulfillment of this agreement, the R/V "Dr. F.N." was commissioned into service in October 1974, and under a sub-contract with NORAD, was placed under the operational control of the Institute of Marine Research, Bergen. Survey operations commenced in February 1975 in the North West Arabian Sea and have continued up to the present time generally in the Indian Ocean and West African areas.

Eight years of survey work having now been completed, NORAD decided, with FAO's concurrence to commission an evaluation of the results achieved to date by using the vessel and the follow-up work in the recipient countries.

c. Data collection

Based on selection criteria which were agreed on beforehand with NORAD, the mission chose six countries to represent the 38 countries surveyed by R/V "Dr. F.N.".

The six countries were: Burma, Sri Lanka, Pakistan, Kenya, Somalia og Mozambique. These countries were visited by the evaluation team. Additional data from the rest of the recipient countries was collected by post enquires (see Appendix 4).

d. Selection of countries surveyed by R/V "Dr. Fridtjof Nansen".

The mission found that there were logical links between vessel surveys and ongoing FAO project activities, espe-cially in the beginning when the NW Arabian Sea survey formed an integral part of the Indian Ocean Programme of work. At later stages there were links with other projects such as Bay of Bengal and South China Sea projects and in the case of the West African surveys with the work of the Eastern Central Atlantic Fisheries Commission (CECAF).

As regards periods of surveys funded wholly by NORAD, only in the case of investigations of the Tanzanian waters was there a link with an ongoing major NORAD project - namely the Mbegani programme.

The mission thoroughly endorses such linkages as and when they can be made, because it provides mutual benefit and make it easier to disseminate survey results later on.

Some survey activity resulted from specific country requests and the timing of certain of the surveys resulted more from logistic convenience than for other reasons, but it was concluded that these were not a major element in the selection process.

e. Communication with survey countries.

In several of the countries it was commented on the short notice given prior to the commencement of a survey, which gave little or no opportunity to select and prepare appropriate local counterpart staff, or to allow the inclusion of national components into the survey programs.

Greater effort should be made to involve national authorities and scientists in the planning process with the aim of obtaining optimum benefit from the time and effort employed during each survey period.

f. Planning and administration of survey operations.

On the basis of interpretations of existing agreements for planning and implementation of the surveys, it appears that the bulk of actions concerning preparation, planning and execution of the surveys have been undertaken thus far by the Marine Institute, Bergen.

Both FAO and NORAD should take a more active role at the planning stage. A more active involvement of both headquarters and country representatives would ensure that all interests, including that of the recipient countries was taken into consideration.

g. Survey methodology and limitations for stock assessment.

The team was asked to discuss the relevance and adequacy of the survey methods.

The major strengths of the survey methods are their facility to provide recipient governments with extensive series of data on hydrographic conditions, plankton and samples of fish for identification studies, data of relevance for mainly longer term fisheries management, and indicative estimates of the size and distribution of surveyable fish stocks occurring within their national waters.

However, several shortcomings were also identified, for example the acoustic survey technique is inaccurate for assessments of stocks of fish close to the bottom or near the surface. Surveying were not possible in water shallower than about 10 m because of vessel size. The methods are clearly relevant to other stocks, namely pelagic and, to a somewhat lesser extent, demersal ones not on the bottom. A further shortcoming concerns the research vessel's limited capability to operate commercial type fishing gear and hence to carry out simulated commercial fishing to determine catch rates.

h. Reporting and follow-up.

In general it was concluded that the reporting and presentation of survey data was handled in a competent and professional manner as regards the use of report contents for scientific purposes. In most cases the cruise and final reports were produced with minimal delay.

The team was informed that survey results were frequently referred to in planning documents and as reference material by local fisheries administration, but there were evident shortcomings in the understanding of and in the distribution of the reports which reduced their effectiveness as tools for fisheries development.

The reports are unquestionably of a highly technical nature, dealing as they do with very complex situations at sea, and it is far from easy for non-technical staff to understand them or be able to extract the crucial implications of "Dr. Fridtjof Nansen findings". There is in consequence an urgent need for a parallel commentary report in each case, wherein the findings from the scientific surveys can be described in a more easily understandable and applied form, drawing particular attention to implications from survey results for fisheries development and management, for the benefit of the staff of planning and other departments who are also involved in decisions regarding fisheries activities.

In some of the final reports, local scientists have taken part as co-authors. The benefit from this is unquestionable both to ensure follow-up, and for better understanding of the implications of the survey findings in the recipient countries.

The evaluation mission endorses such action as has been undertaken to follow-up the presentation of survey reports to countries, by visits and other actions designed to promote the understanding of and use of survey findings in the countries concerned.

The Karachi Workshop in 1978 was organized as a follow-up action as a part of the Indian Ocean Programme, and was reasonably effective. Another example is the round-table conference in Colombo which was initiated by NORAD, which was very much appraised by all concerned in Sri Lanka.

In general, however, the important task of follow-up has not been performed as well or as thoroughly as it should have been. One reason for this is a lack of defined responsibility for the follow-up role.

i. Utilization of survey results by recipient governments and institutions.

The survey results have been utilized for fisheries research and for educational purposes. The extent to which this has happend is to a large extent dependent on the existence of national counterparts, and their level of competence. In most countries the stock assessments made are used in the general development planning. The survey data are of basic importance for setting realistic targets for fisheries development. References to the R/V "Dr. F.N." survey data can be seen in most of the fisheries development plans for the countries visited, and this is also reported by countries contacted by mail. The plans include information concerning the identification of the different fish resources, their size and distribution ect.

The utilization for exploitation of the fish resources identified is more questionable. A major problem in most of the developing countries is a low capacity for the dissemination of information. In some instances the team was informed that the management of the state owned fishing company had not seen the survey report, nor were they informed about its content.

In order to extend the usefulness of the stock assessment data there is a need for monitoring and for experimental/commercial fishing in most of the countries. There is also a need for other follow-up activities which can overcome institutional barriers and other organizational problems.

The most significant use of the survey results by the industry occurred in the cases where an expansion of the offshore fishing fleet was decelerated because of the evidence made available by the survey vessel.

j. Major conclusions and recommendations.

1. Throughout the eight years of operation the vessel has been very competently and effectively operated. R/V "Dr. F.N." has provided many of the countries concerned with the first systematic assessment of the fish resources within their waters, and thereby contributed to rational development of the fisheries of the recipient countries. There is unquestionably a need for further surveys, and it is recommended that the R/V "Dr. F.N." project should be continued, with regards given to the recommendations in this report.

2. The first and major objective, appraisal of the fish resources, has to a large extent been fulfilled. The other main task of the project, assessment of the catch-ability of the resources, has been fulfilled to a limited extent only. The training objective is regarded as most important by the recipient countries, and steps should be taken to ensure the best possible outcome of the training effort.

3. The aims and the objectives of the project should be reconsidered and redefined in regard to the achievements and the experiences so far. FAO and NORAD should agree on these and they should also reach an agreement for the assignment of responsibilities amongst the institutions involved.

4. As a consequence of the inability of R/V "Dr. F.N." to operate in shallow waters (under 10-15 meters), and limits in the assessment of catchability of the fish resources it should be considered to associate R/V "Dr. F.N." with a smaller inshore going local research vessel and/or a commercial vessel.

5. For scientific purposes the reporting and presentation of data is adequate and prepared in a very competent manner. There is, however, a need for a commentary report where the implications of the findings for fisheries planning, and commercial purposes are explained. The commentary report should be produced in the language of the country concerned, and preferably in collaboration with local staff.

6. The team strongly recommends that the follow-up activities are extended and upgraded. Both FAO and NORAD should bear a greater responsibility in this respect. A fund-in-trust should be established, and a person assigned the responsibility for follow-up activities on a full time basis.

7. It is concluded that the most effective use of the vessel will result from a concentration of effort, e.g. completing coverage in particular areas and more detailed studies of particular stocks or promising areas for development identified. There are many reasons why effort should be concentrated, a most important one being that of securing the integration of the survey work to the fisheries development in the recipient countries.

A. INTRODUCTION.

A.1. Appointment of the evaluation team.

In accordance with discussions in NORAD during the fall of 1981 that an evaluation of the R/V "Dr. Fridtjof Nansen" project should be carried out during the latter part of 1982, and after having informed FAO on the matter, NORAD in September/October 1982 appointed an evaluation team. NORAD wanted an evaluation of the project because of mainly three related factors:

- the ongoing negotiations with FAO on the future cost sharing arrangement between FAO and NORAD
- the increase in the costs of running the vessel that had occurred during the years was another factor of concern
- thirdly, the benefits to the recipient countries from the project were not known.

with the following members:

- Mr. Abraham Hallenstvedt, Professor Organizational Theory Norwegian University of Fisheries (team leader)
- Mr. R. W. Ellis, Marine Biologist, UK
- Mr. C. E. P. Watson, Fishery Development Adviser, UK

Ms. Kirsten Bjøru, sociologist, acted as sectretary for the evaluation team.

A.2. Terms of reference.

The terms of reference were written up by NORAD and sent the Fisheries Department, FAO, Rome, for comments.

The task of the evaluation team was stated as follows:

"The evaluation team shall:

1) Discuss the procedures for selection of survey countries, both with regard to bilateral and multi-lateral programmes, and assess if this selection has been reasonable regarding registration of needs and likelihood of efficient use.

2) Assess if the communication with the survey countries, before, during and after the surveys, has been adequate.

3) Discuss the administrative set-up and division of responsibilities between FAO, NORAD and the Norwegian Institute of Marine Research, regarding operation of the vessel and the arrangement of surveys and final reports.

4) Discuss the relevance and adequacy of survey methods including the follow-up with the national fisheries authorities of the recipient countries.

5) Assess the quality and relevance of the reports and the form of presentation applied in the final reports, and report on the actual or planned use of the resource information in these reports in the elaboration of fisheries plans or for other purposes.

The main emphasis on the evaluation will be on issue 5). The discussion of the remaining subjects should be geared towards a meaningful answer to issue 5), in order to evaluate the end-use of the information collected by R/V "Dr. Fridtjof Nansen" in the countries surveyed."

At the initial meeting of the evaluation team in Oslo during October 1982, the terms of reference (Appendix 1 (a)) were discussed in the light of additional comments received from FAO Headquarters - Kojima telex dated 13th October (Appendix 1 (b)).

The original text of the terms of reference was accepted as basis for work by the evaluation mission, since FAO's suggestions would have introduced only minor changes in emphasis. It was however agreed to bear FAO's suggestions in mind, particularly as regards "changes in survey methodology as a result of experiences gained" (§ 4 terms of reference), and added emphasis to the "evaluation of actual or planned use of the survey data, reports and recommendations by recipient countries, NORAD and FAO".

A.3. Work schedule for the evaluation team.

Four main lines of approach were used by the team in the conduct of the evaluation. These were as follows:

a. Field visits and interviews:

The principal part of the evaluation of the project was carried out by visiting a sample of the countries where the research vessel had operated and interviewing personnel in relevant institutions within these countries. These institutions usually consisted of the following:

- the fisheries departments within both the national and regional ministries or other agencies responsible for the administration of marine fisheries.

- government agencies responsible for general policy and planning.

- fishery research establishments both within government and universities.

- private and state fishing companies.

- NORAD representatives when present in a country.

- UNDP and FAO country representatives and FAO staff members associated with fisheries projects when present in a country.

- staff of bilateral aided fisheries projects.

Most of the appointments were made prior to the team's arrival in the country usually with the assistance of local UNDP or NORAD representatives. A comprehensive list of the persons met during the trip is shown as Appendix 3.

As well as information directly related to the terms of reference, both prior to and during the visits, the opportunity was taken to collect general information on the fisheries sector of the countries visited. It should

perhaps be stated here that all of the people interviewed were extremely helpful and appeared genuinely grateful to the Norwegian Government for providing them with the services of the vessel.

b. Postal enquiries:

Since it was clearly impossible for the team to visit all of the countries which had been surveyed by the research vessel, an attempt was made to obtain information from the remaining countries by sending enquiry letters to the agencies which would otherwise have been visited. A sample of the letter is shown as Appendix 4. In addressing these letters, special attention was given to those local administrators or scientists who had participated on cruises of the vessel or had received subsequent training at the Bergen Institute. The response to this postal survey is discussed in a later section. The countries contacted and those which replied are listed in Appendix 4.

c. Contacts with agencies involved with the administration and conduct of the surveys:

Both before and after the field trip, the team had extensive discussions with appropriate staff members of NORAD and the Bergen Institute. The team was also fortunate to have an opportunity, in Mombasa, Kenya, to visit the research vessel, inspect its facilities and to hold discussions with the onboard scientists and crew members.

FAO Headquarters in Rome was the first stop of the field trip. The Fisheries Department staff most concerned with the operations of the research vessel were assembled for a meeting with the evaluation team and the discussions proved to be very useful. The FAO Fleet Manager was not present in Rome at the time of the team's visit but it

proved to be possible to meet him later in Bangkok. Similarly, FAO arranged for the team to meet in Paris with their Project Coordinator for the East Central Atlantic Fisheries Commission (CECAF), to discuss survey findings in West African waters.

d. Assessment of acoustic survey methodology:

Among the terms of reference for the team was the requirement that an assessment be made of the acoustic survey methodology used by the research vessel. Professor Kjell Olsen of the University of Tromsø was commissioned to prepare a review paper, which is incorporated in this report as Appendix 7.

A.4. Time schedule for the evaluation.

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20/9 The secretary for the evaluation team started her work. During the period before the team was appointed preparatory work for the evaluation was carried out. A post enquire letter was sent to all the recipient countries as well as to the individual local scientists who participated on board the vessel.

11/10 By the 11th of October, at a meeting in Oslo between the members of the team, the Evaluation and Research Division, NORAD, and the Fisheries Division, NORAD, the team as a whole had been appointed.

12/10 A preparatory meeting was held in Bergen between the researchers connected to the R/V "Dr. F.N." project at the Norwegian Institute for Marine Research, Bergen, and the evaluation team. Out of the recipient countries 6 were selected for case studies. Preparatory work for the country visits was carried out subsequently.

14/11-
16/12 Field work. The evaluation team made visits to

- FAO, Rome, 15/11-16/11
- Burma, Rangoon, 17/11-22/11
- Bangkok, Meeting with Mr. Fitzpatrick, Fleet Manager, FAO
- Sri Lanka, Colombo, 23/11-26/11
- Pakistan, Karachi and Islamabad, 27/11-30/11
- Kenya, Nairobi and Mombasa, 1/12-4/12 to 9/12-11/12 Met with the vessel and her crew in Mombasa 4/12
- Somalia, Mogadishu, 5/12-9/12
- Mozambique, Maputo, 11/12-15/12
- Paris, 16/12, met with Mr. Everett, of the FAO CECAF project based in Dakar, Senegal.

See Appendix 3 for a comprehensive list of persons met.

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19/1	Meetings with the Fisheries Division, NORAD, and the Evaluation and Research Division, NORAD, in Oslo
20/1	Meeting at the Norwegian Institute for Marine Research, in Bergen
20/1- 21/1	The evaluation team meets for discussions about conclusions and recommendations.
4/2- 5/2	Final meeting of the evaluation team
28/2	The manuscript is delivered to NORAD

A.5. Selection of 6 sample countries for field visits by the evaluation team.

Between February, 1975, and December, 1982, the vessel has operated in the waters of 38 countries throughout the Indian Ocean, the Mediterranean and the coast off West Africa (see list of countries in Appendix 4).

On the basis of criterias agreed upon between the team and the Evaluation and Research Division in NORAD, and on discussions in NORAD, at the IMR Bergen, and among the members of the team, the team was able to shortlist the most desirable criteria for the selection of the six countries where case studies should be conducted. These criteria were:

1. Different levels of technology within the fisheries sector. Where applicable: Take account of regional differences within the country in question.

2. Multilateral/bilateral use of the vessel.

3. Norwegian main party countries should be included.

4. Geographical distribution. Atlantic/Indian Ocean and within the Indian Ocean.

5. Countries where the report is used/is not used.

6. According to duration of survey period/One or several seasons covered.

7. Early/late in the history of the project.

8. According to capacity to respond; knowledge; training; technology.

9. Economic criteria - Importance of the fisheries sector. (share of GDP, employment, increase in catches acc. to species).

10. Type of economy; centrally planned, mixed or mainly private.

It should be noted that how each of the countries perform/is placed according to some of the criterias, was not yet known, and would form a part of the findings of the evaluation. The countries selected were: Burma, Sri Lanka, Pakistan, Somalia, Kenya and Mozambique. See Appendix 5 and 6.

During the first part of the selection procedure Senegal was included as a representative of the West African countries, and because of the location of the CECAF project, while Kenya was not selected. Mainly because of the timing of the fieldwork just before Christmas it was difficult to incorporate the journey to Senegal within the itinerary agreed upon. Secondly, Senegal and the rest of the West African countries (except for Cape Verde) had only received the cruise report and not the final report yet. On the other hand, because the inclusion of Somalia and Mozambique involved travel routing through Nairobi, Kenya was selected as the sixth country. Because the team was able to meet with Mr. Everett, the coordinator of the CECAF office, in Paris on the way home, some information from West Africa was provided.

B. THE NORAD/FAO "DR. FRIDTJOF NANSEN" PROJECT.

B.1. Project background.

In 1971, FAO asked the Government of Norway if it could provide a research vessel to the Organization, suggesting that FAO covers part of the operating costs. The request was approved by NORAD in 1971 and an agreement between FAO and the Norwegian Agency for International Development regarding the construction and operation of a fishery research vessel was signed on 27 September 1971. An agreement between FAO and the Institute of Marine Research regarding the operation of the vessel was signed 27/9-1971 (see section B.2).

The Working Group proposed the establishment of a FAO/NORAD programme for the operation of the fishery survey vessel, the operational tasks, kinds of resources, areas of operation, and periods of assignment were the following (see the Final Report of the Working Group, January 1971):

> "of having available a vessel for new projects whilst these are awaiting delivery of their own vessels, which often takes a very long time, or for projects which are experiencing extended periods of inoperation of their own vessel due to a major breakdown. I can also foresee other important uses for such a vessel, for example to extend the activities of certain projects, for limited periods, both in scope and in geographic area.
>
> The main tasks will thus be related to the survey and appraisal of resources, and the assessment of their catchability. The vessel should be able to carry out clearly fishery-oriented biological research and be able to use modern fishing gear of various kinds for experimental fishing. Thus it must be equipped with advanced acoustic fish detection instruments. As a secondary task, training may be undertaken.
>
> The vessel should be able to use commercial-sized gear so as to determine realistic catch rates.

The resources to be studied will be both demersal and pelagic fish species of commercial importance. Thus the vessel should be equipped to carry out both bottom and midwater trawling as well as purse seining.

Simple arrangements should be made for longlining.

The areas of operations will be tropical, sub-tropical and temperate waters, such as the Indian Ocean area, Indonesia, Brazil, Southern Argentina and Chile, as well as the Atlantic coast of Morocco. Both air-conditioning and heating will therefore be necessary.

Periods of assignment to individual projects will normally vary from 9 to 18 months."

The construction costs of the vessel were met by NORAD and the vessel "Dr. Fridtjof Nansen" was delivered from the yard in October 1974. It was made available to FAO from January 1975. The vessel's first project (1975-1976) was the "North Arabian Sea Survey". In Appendix 5 is listed the survey assignments to date including maps and a table of seasonal coverage by country surveyed.

During 1977, due to financial difficulties in UNDP, FAO was unable to meet their previously agreed share of the expenses. For this reason the vessel was used bilaterally during 1977, 1978, half of 1979 and April-December 1982. This was certainly a constraint on the cooperation between FAO and NORAD from 1977 and onwards, and in effect put a heavier burden of responsibility for planning and follow-up particulary to the Institute of Marine Research in Bergen.

B.2. Administrative arrangements/project organization.

a. The Working Group and the Final Report.

A working group with members from NORAD, FAO and the Marine Institute, Bergen, was established in 1970 to settle the operating conditions for the proposed FAO/NORAD fishery survey vessel.

The working group should according to its terms of reference (Paragraph 3.6) study the following:

> "The running of the vessel ..... especially with regard to the allocation of responsibility between the field projects, FAO Headquarter and NORAD."

The FINAL REPORT of the working group was presented on the 15th January 1971.

In paragraph 6 of the Final Report the responsibilities for operation and administration of the vessel and the surveys are stated.

- FAO's responsibility was to plan and implement the vessel's research programme.
- FAO's determination of areas of operation should be done in consultation with NORAD.
- FAO should also obtain permission for the vessel to operate in territorial waters.
- NORAD through agents, should take care of formalities in harbours.
- NORAD/Marine Institute, Bergen, should be responsible for the proper running of the ship and its operation.

In paragraph 5 the annual budget and the sharing of costs are outlined. The annual budget for the operation of the vessel was in 1971 estimated to be about US$ 365 000. According to a letter from Mr. Jackson, Assistant Director General (Fisheries) FAO, 17th April 1971, it was estimated that FAO could contribute US$ 150 000, or roughly 40 % of the total cost.

b. The FAO/NORAD Agreement (Appendix 8).

To avoid the necessity of making individual agreements for assignments to different projects, it was recommended that a general agreement should be made between FAO and NORAD on the use of the vessel. Such a general agreement was concluded in September 1971. The Agreement is mainly concerned with the operating costs, their sharing and other budgeting arrangements. Almost nothing is said about assignments of responsibilities between the parties involved, except for the technicalities related to budgeting and cost sharing. This might be seen as a forewarning of what should be a key question in the implementation of the whole project.

In Article IV - OPERATING COSTS (which covers two pages out of a total of three and a half) it is stated in paragraph a (iv) that FAO

> " ..... anticipates that it will make payment to the Institute of 40 per cent of the yearly operating cost of the vessel".

The lack of a firm financial committment from FAO which can be read from this, results from the fact that FAO is not authorized to commit itself on a long term basis because of the dependence of allocations from the UNDP for their own funding. A reason for stressing this fact is the observation that the sharing of cost between FAO/NORAD of 40/60 % became more or less a fixation point in the discussions to come.

One reason why very little is said about assignments of responsibilities in the FAO/NORAD agreement might have been the following statement made in the FAO/NORAD agreement:

> "The vessel shall be placed at the disposal of the Organization."

This of course was a statement in accordance with the whole idea behind the project. FAO had the research vessel at its disposal and was responsible for the planning of the survey programme and also for its implementation.

In Article III in the Agreement it is stated that the vessel shall be operated:

" ..... by the Norwegian Institute of Marine Research, Bergen".

Detailed arrangements for this operation should be set in an agreement between FAO and the Marine Institute.

c. <u>The FAO - Marine Institute Contract (Appendix 9).</u>

The contract between FAO and the Marine Institute was signed the same day as the Agreement between FAO and NORAD (September 27th 1971). In Article I in the contract "planning of the use of the vessel and the budgeting of operating costs", it is stated that FAO will submit to the Marine Institute a plan for the use of the vessel by 1st August each year. Based on this plan the Marine Institute should submit a budget proposal to both NORAD and FAO for approval. The rest of the contract describes the detailed arrangements and responsibilities concerning the vessel's operation, manpower, maintenance, financial procedures, etc.

d. <u>Problems inherited in the project organization</u>.

In summary the responsibilities for the R/V "Dr. F.N." project were assigned in the following manner in September 1971.

I. FAO was assigned the responsibility for the planning and implementation of the survey programmes. FAO "anticipated" that it would pay 40 % of the operating costs.

II. NORAD's responsibility was to pay for the construction of the vessel and cover at least 60 % of the operational costs.

III. The Marine Institute should be responsible for the operation of the vessel according to plans submitted by FAO.

Logically, the agreements and contracts are mainly concerned with how to operate the research vessel, since the vessel would not be operational before 1974. Quite naturally, the main concerns were the practical questions of technical and financial nature. Looking back to this agreement 11 years later, and after 8 years of operation it is more natural to ask questions about how the survey results are handled.

No responsibility was assigned regarding the handling of the survey results. Survey-reporting is not mentioned at all nor are any follow-up activities relating to the surveys. However, from the fact that FAO was responsible for the planning and implementation of the survey programmes, it follows that FAO also had the responsibility for the end use of the survey results and for the follow-up to ensure application of these results. In other words: the application of the survey results was supposed to be related to ongoing or planned FAO fisheries development projects. As it is said by FAO that it has found it necessary to obtain a fishery research vessel " ..... in order to implement its fishery field projects".

e. Financial problems and organizational breakdown.

At the end of 1974 R/V "Dr. F.N." was constructed and ready for survey operations.

An agreement was concluded between NORAD and the Marine Institute in November 1974 on the management of the vessel. By January 1975 R/V "Dr. F.N." was available for charter to FAO, and started surveying in the North Arabic Sea as a part of the UNDP "Indian Ocean Fishing Survey and Development Programme". The charter contract between FAO and the Marine Institute is an extensive description of objectives, tasks and responsibilities.

For two years the vessel was operated in accordance with the intentions as they were outlined in the planning documents, agreements and charter contract.

From 1977 however, FAO was not able to pay their share of the operational cost of the vessel, and their role as survey planners was not executed either. This ment that the whole idea behind the research vessel project was changed. The main actor in the administrative arrangement did not fulfil its role. In consequence, the function of survey planning and implementation was left to NORAD and the Marine Institute.

For two and a half year the vessel had to be assigned bilaterally with NORAD as contract partner. Considerable strain was imposed on the FAO/NORAD relation in this period concerning the 40/60 per cent cost-sharing.

It should be said that there has been to much emphasis on the financial aspects of the project execution. The sharing of the operational cost of the vessel,

important as that may be, should be second to the question of assignments of responsibilities for planning, execution and above all, for the implementation of the end product from the surveys.

Since the summer 1979 FAO again participated financially and chartered the vessel on an ad-hoc basis until 1982 when NORAD again sponsored the operation 100 %.

There is a need to organize the most important management-functions in a way that is not directly dependant on the cost sharing between FAO and NORAD. FAO's two most important roles was survey programme planning and their role as a link between the surveys and fisheries development projects. The implementation of the end product should not be too dependant on who is paying the bill.

C. PRINCIPAL FINDINGS FROM THE COUNTRIES VISITED AND AGENCIES CONSULTED BY THE EVALUATION TEAM.

C.1.1. Minutes of the meetings at NORAD, Oslo, October 11th 1982 and January 19th 1983.

Officials interviewed:

Mr. Ole Andreas Lunder, Head of Fisheries Division
Ms. Vigdis Langsholdt, Senior Officer, Fisheries Division

Mr. Lunder gave an overview on the history of the vessel and its operation. The background and the thinking at the planning stage in 1971/72 was discussed in relation to the period 1975-82. In particular the annual cost of operations and the cost sharing between NORAD and FAO was a central theme in the discussion. The original agreement that FAO should pay a 40 % share of the annual operational cost lasted only for two years (1975 and 1976). From that time on FAO was not able to pay its share of the operational cost and this imposed some strain on the NORAD-FAO relation concerning the project.

Basically, the agreement made between NORAD and FAO in 1971 has not been changed. FAO should be handed over the vessel, and should be responsible for the planning of its use and also for the follow-up. NORAD should mainly approve the budget and pay its share of the operational cost. The operation of the vessel itself was left to the Marine Institute based on an agreement made in 1974.

The two first years of surveys in the North-West Arabian Sea can be regarded as successful seen in light of the original plans for the project. Since then, it has been a problem not only with FAO's financial commitment but also with the management commitment.

NORAD had felt that institutions within the recipient countries should participate at the planning stage to a larger extent, but that would require longer planning periodes.

The "Nansen Class vessel" is regarded as a good construction, but there are limitations to its operation, e.g. inshore waters and bottom schools are not fully covered.

The team was also informed that the Fisheries Division was not directly involved in the training of scientists on board the vessel. The question of training was mainly handled by the Marine Institute and institutions in the countries involved. (NORAD-fellowships are handled by a special office within NORAD).

The used of R/V "Dr. F.N." and the selection of countries and areas for operation had been discussed several times in the NORAD "Fishery Advisory Group", e.g. Pakistan 1977, Mozambique 1977/78, Seychelles 1978 and Sri Lanka 1978.

Finally, the Fisheries Division stressed that much of the decision making process between NORAD and the Marine Institute was of a rather informal nature.

C.1.2. Minutes of the meetings at the Institute of Marine Research (IMR), Bergen, 12th October 1982 and 20th January 1983.

Officials interviewed:

Mr. Gunnar Sætersdal,	Director
Mr. Rolf Sælen,	Operational Manager
Mr. Roald Sætre,	Scientist
Mr. Tore Strømme,	Scientist

Director Gunnar Sætersdal gave an introduction about the operation of R/V "Dr. F.N.".

IMR has regarded the vessel and its operation as an important project. The Institute regarded the operation of the vessel and the surveys technically speaking to be of normal standard.

Sætersdal would have liked to see more follow-up work. The efforts made had not been sufficient. IMR had participated when FAO and NORAD had requested it. More should be done to make the information from the surveys understandable. The type of seminars/conferences held in Karachi and Colombo should be arranged more regularly.

In the discussions about the reports IMR expressed concern about what actually happened after the reports were delivered.

Concerning the training of local scientists IMR had the experience that the benefits varied quite considerably. It was seen important to get the local scientists involved in the surveys also for the follow-up. But often it was too little time available for prior contact and often difficult to establish a workable relation to institutions and scientists before surveys. This is the type of knowledge and relations that is established as a result of the survey work.

On the question of selection of countries and regions for surveying and whether one should concentrate on a few countries or cover large areas, Sætersdal answered that this very much depends on the objectives of the research. If you are out to monitoring the resources for management purposes, concentration is a necessity. If your purpose is stock assessment for general planning, concentration is not so important as long as your surveys cover the different seasons.

IMR felt in some instances that FAO asked the vessel to go for too many areas.

In many areas already surveyed the work done should not be regarded as sufficient, partly because of seasonal fluctuations, but also for other reasons. Some countries want more catch rates than the research vessel can give.

Examples given of need for repeating surveys/completing work to be done:

Mozambique waters have got 6 complete covers of off-shore resources. Resources are abundant, and more work is needed related to the fishability of resources (gear and vessel application). Mozambique also wants research collaboration for development of their own fisheries research.

In Somalia resources are underutilized. They need information for better assessment of stock size and about the kind of vessels and gears that should be applied.

In West Africa a monitoring type of work would be useful.

More research is also needed in Pakistan and Burma waters and there is generally more to be done related to the FAO project in the Bay of Bengal.

In general - it is always a need for continuous surveys, methods are being improved, resources fluctuate etc.

On the question of Oceanic fisheries, e.g. tuna, Sætersdal would rule that out as a realistic possibility.

As to the question of the use of the survey result IMR felt that one of the greatest achievements of the R/V "Dr. F.N." project has been to prevent developing countries from overinvestment in deep sea fisheries.

C.2. FAO, Fisheries Department, Rome, 15th and 16th November 1982.

Persons interviewed:

Mr. N. Kojima,	Director, Operations Service (FIO)
Mr. M. J. Mann,	Senior Project Operations Officer Africa Group (FIO)
Dr. H. D. R. Iyengar,	Senior Officer Trust Funds (FIO)
Mr. C. M. Monrufet,	Assistant Fleet Manager, Fleet Management Unit (FIOF)
Mr. I. J. B. Robertson,	Senior Fishery Industry Officer, Fishery Industries Division (FII)
Dr. Armin Lindquist,	Director, Fishery Resources and Environment Division (FIR)
Mr. S. C. Venema,	Fishery Resoruces Officer, Marine Resources Service (FIRM)

Record of main meeting is contained in the following summary minute covering the principal points of comment and discussion with regard to terms of reference (Appendix 1).

General remarks to the R/V "Dr. F.N." project and its administration.

FAO was mainly happy with the arrangement, but feels it has not been consulted as much as it should have been in deciding the detailed work programme for the vessel. More active follow-up on supporting trainees after the cruises is needed. FAO should be consulted in advance of any changes in the original programme and should be more actively involved in determining proposed cruise tracks than has been the case in the past.

The efficiency of the operation of the vessel was regarded adequate indeed, and the record of effective days at sea under difficult conditions was admired.

Selection of survey countries.

The selection of survey countries was based on the following criteria:

1. the need for information or confirmation of existing estimates,
2. the existence of institutes or other institutions that could be expected to make use of the survey data,
3. requests from governments,
4. linkage with other UNDP/FAO projects,
5. NORAD/Marine Institute preferences (which sometimes overrides FAO's preliminary selection).

The team was informed about a number of country selections based on the criterias listed.

Methodology.

The surveys done by R/V "Dr. F.N." were in many ways pioneering, but provided only a part of the information needed for resource assessment (e.g. noncoverage of bottom species, shallow inshore grounds and surface shoaling pelagics etc.) FAO is the main source for data on these topics in the developing countries and needs to be more involved in compiling such data. Benefits would flow from encouraging firms such as SIMRAD to update R/V "Dr. F.N."'s acoustic capability with latest equipment under development - e.g. situation display sonar, and surface ranging gear for tuna etc. and perhaps NORAD could make a financial contribution to SIMRAD to stimulate such developments.

Test fishing to establish catch rates (rather than for species identification and composition of catches) should be kept separate from acoustic surveys. R/V "Dr. F.N." is not particularly well equipped for commercial catch rate work (also accepted by IMR), therefore more active collaboration with local research and commercial fishing craft is needed.

Communication, reporting and follow-up.

The FAO staff regarded the reports to be highly technical and at least partly unintelligable to non-technical persons in the recipient countries who may be responsible for follow-up decisions. Therefore there is an unsatisfied need for a less technical commentary on the reports drawing attention to implications for development and pointing the way for appropriate national decisions.

In part this need can be resolved by follow-up activities to give extra explanations or clarifications at time of handing over the preliminary report. The follow-up should have been organized in a better way, but regrettable it was no funding for this type of work.

Note. This could involve the need for a preliminary mission being sent to the countries concerned to obtain national agreements to programmes and not rely on correspondence - however this poses the problem of funding such missions. There is also the question yet to be resolved of FAO's share of costs.

The text of the legal agreements between FAO/NORAD/IMR do not define the format of reporting.FAO is partly responsible for distribution of reports and when co-funder they reasonably expects reports to receive recognition of this. FAO also expressed some dissatisfaction with the present arrangements for inclusion of other reports, data and references to earlier and parallel work.

In general, little criticism of the technical content and professionalism of the work and reportage, but as noted above the present format lacks a non-technical commentary for benefit of officials in recipient countries who find it difficult to extract the salient factors having implications for national development planning decisions.

Bangkok, 23rd November 1982.

Mr. J. Fitzpatrick — Fleet Manager, Fleet Management Unit (FIOF), Fisheries Department, FAO, Rome

The meeting with Fitzpatrick in Bangkok generally confirmed the points raised above, particularly as regards weakness of existing contractual arrangements for cruise planning and report writing. He agreed with the need for a commentary to supplement present technical reports, but also noted the role of CECAF, South China Sea Programme and the former Indian Ocean Programme in drawing the attention of governments to salient points in general follow-up.

Concerning the sharing of the running cost of the vessel between FAO and NORAD it was stressed that FAO was not in a position to garantee any percentage, whether that be 40 % or 20 %. FAO could only participate with a certain sum of money, depending on its planned use of the vessel, and depending on the UNDP funding. It appeared that there has been some difference of opinion in FAO about the R/V "Dr. F.N." concept, but a future need for surveys was accepted especially in Arabian Sea, S. Madagascar, East India coast and to complete Malaysian/ Sumatran survey.

C.3. Burma, 18th-22nd November 1982.

Officials interviewed:

Captain (Navy)Sein Tun,	Managing Director, Peoples Pearl and Fishery Corporation (PPFC)
U Khin Maung Latt,	Director General, Planning and Statistics Department, Fisheries Department Ministry of Agriculture and Forests
C. Yin Chang,	Director, Foreign Loans Department, PPFC
U Sin Maung,	Deputy General Manager/Advisor Foreign Loan Project Department, PPFC
Lt. Comdr. Han Tun (BN),	General Manager for the Marine Production, PPFC
Dr. Sann Aung,	Scientist, Marine Fisheries Resources Survey and Exploratory Fishing, PPFC
U Sein Lwin,	Statistics Officer, Planning and Statistics Department, Fisheries Department, Ministry of Agriculture and Forests
Ohn Kyaw,	Marine Superintendent (MS) Production, PPFC
U Tha Htun,	Asst. General Manager Production, PPFC
Mr. Erling Dessau,	UNDP Resident Representative
Mr. Jacob Guit,	UNDP Deputy Resident Representative
Mr. Oscar J. S. Lazo,	FAO Representative in Burma
Mr. Davidson Thomas,	FAO Project Leader
Dr. Leo Rijavec,	FAO Team Leader/Survey Specialist

Survey Period: September - November 1979
March - April 1980

Sponsor: UNDP/FAO/NORAD

Selection of country surveyed.

The acoustic survey of marine fish resources of Burma by R/V "Dr. F.N." was conducted as Module 1 of the UNDP/FAO project "Marine Fisheries Resources Survey and Exploratory Fishing". (BUR/77/003). The first survey of pelagic and semi-demersal fish resources was conducted in the postmonsoon period of 1979, and a similar survey was repeated in the premonsoon period 1980. The coastline has not yet been surveyed during the monsoon period.

Survey execution.

Apart from estimating the pelagic and semi-demersal fish biomass, pelagic and bottom trawl hauls have been carried out providing information on species composition of the catches. The surveys of R/V "Dr. F.N." also gave the first information of the bottom conditions in Burmese waters, and provided thereby valuable data on the location of trawlable grounds.

All concerned ackowledged the important contribution of R/V "Dr. F.N." surveys as the first systematic assessments of fish biomass.

It was considered by nearly all concerned that a repeat R/V "Dr. F.N." survey will be desirable in due course, as exploitation proceeds, to verify biomass and indicate trends of change in stock abundance and distribution and secondly to compare results with those of the local research vessel once this is in service. Opinions differed as to when the survey should be repeated, one year to 4 years, but the need does exist.

Methodology.

Dr. Rijavec commented that the use of hydro-acoustic methods in estimating the biomass of marine fish resources is being more and more widespread, particularly for the estimates of pelagic fish resources. Despite some shortcomings of the methodology which are particularly acute in tropical waters, the advantage of a quick and rather precise estimate of unexploited fish resources is valid for most of the tropical pelagic stocks and outweighs the disadvantage. The surveys were regarded well planned, but details of methodology are not very well described in the report. Particularly data on calibration should be added to cover readings at the start and conclusion of survey to permit local experts to verify findings, particularly when these may conflict with other data obtained locally. Some other minor questions regarding methodology also raised, e.g. statement in report (page 46) regarding use of bobbin trawl for prawn survey, (rather than trawl with foot rope and tickler chains) which would seem to be more suitable; and certain percentage figs. used. (Some of these points if included in the report, would further complicate an already highly, technical report and could perhaps best be dealt with in direct communication with IMR.)

Quality and presentation of report.

PPFC Director, Capt. Sein Tun commented that the report as presently written became of value only after local follow-up. A plea was made for fish density measurements to be based on commercial catchability rather than acoustic density response, ref. figs. 13 and 15 etc., also for inclusion of plans and rigging details of all fishing gear used during survey for comparison with local gear.

Communication.

From comments made by various people, communication prior to planning the survey was adequate, but not always satisfactory subsequent to submission of interim report (e.g. complaints were made that letters written seeking further information have not been answered). No follow-up had been done to ensure that the reports were examined and the implication of the survey results for fisheries development were taken into consideration by Burmese officials. The question was raised whether this was a responsibility for the Marine Institute or whether FAO should have done more.

Local follow-up activity.

The FAO/UNDP/PPFC Marine Resource Assessment and Trawl Survey Project is nearly completed and will be terminated 1983 (UNDP/FAO Module II).

Regarding utilization of the results of the survey data for development plans, Burma, together with the Asian Development Bank, had already committed a large investment in fishery development plans before the "Dr. Fridtjof Nansen" survey was made. This investment was based on an overoptimistic assessment of the fish resources in Burmese waters and the actual extent of trawlable grounds. Based on the R/V "Dr. F.N." survey data, and the follow-up activities by exploratory fishing under the Module II-program, a more reasonable idea of fish resources is now being established. Accordingly, a review had been carried out for consolidation of the fisheries development plans.

Fisheries administration and institutions.

The two main departments within the Ministry of Agriculture and Forests responsible for the development of the fishery sector are:

- Fisheries Department, which is responsible for fisheries planning and fisheries statistics, extension service and training.
- Peoples Pearl and Fisheries Corporation (PPFC) which is responsible for marine fisheries production, marketing and research.

PPFC is also the technical counterpart to FAO and other project donors within the fisheries sector.

PPFC is responsible for the operation of a fleet of some 100 modern fishing vessels, mainly trawlers. The rapid expansion into deep sea fisheries run into difficulties because of several shortages: skilled manpower, fuel shortages, management problems, and most important, the fish resources were not at the size expected.

PPFC fishing operations are said to be more regular now than was reported earlier, fuel shortages have been resolved, and up to 50 of the fleet now regularly operational. 30 vessels remain unserviceable and about 20 are being used for other work, e.g. fishcarriers from artisanal fishing centres.

The most important finding during the visit to Burma was the strong impression gained by the team that, if the surveys had been conducted prior to the build up of the mechanized fleet to its present and currently unprofitable levels, the government would have been more cautious in its investment.

C.4. Sri Lanka, 24th-26th November 1982.

Officials interviewed:

Mr. Claude Fernando,	Director of Planning and Programming Division, Ministry of Fisheries
Mr. Thurirajah,	Deputy Director, Department of Planning and Programming, Ministry of Fisheries
Mr. Wewelwella,	Director of Development Division, Ministry of Fisheries
Mr. Onil Perera,	Director General, National Aquatic Research Agency (NARA)
Mrs. Dianutha,	Research Officer, Marine Biologist, NARA
Mr. M. S. M. Siddeek,	Research Officer, Population Dynamics and Statistics, NARA
Mr. K.T. Weerasooriya,	Research Officer, Gear Technologist, NARA
Mr. M. P. Wickremasinghe,	Secretary, Ceylon Fisheries Corporation
Dr. G. H. P. de Bruin,	Senior Scientist, Marine Biology
Several Fisheries Inspectors,	Colombo DFEO Division
Mr. Istvan Ozorai,	FAO Representative in Sri Lanka
Mr. E. Dingstad,	NORAD Resident Representative
Mr. Tore Selvig	NORAD Ass. Resident Representative

Survey Period: Aug.-Sept. 1978; Apr.-June 1979; Jan.-Feb. 1980.
Sponsor: NORAD bilateral aid alone

Selection of country surveyed.

Selection based on a request from Sri Lanka to NORAD October/November 1977 related to trawlproject LKA 001. Sri Lanka asked for the vessel to estimate the fish resources and chart the bottom conditions in their waters.

At the same time FAO announced their intention to use the vessel from September 1978 for a project outside Angola/ Namibia and later outside Mauritania/Sierra Leone. Due to

the uncertainty about FAO's ability to meet the proposed 40 % share of the operational cost at that time, it was agreed to postpone these plans until 1979, and NORAD assigned the vessel for Sri Lanka where the first survey was made August/September 1978.

Sri Lanka's need for guidance as to resource size for planning purposes at the time of the request was aqute. Plans were already made for investments in a trawl programme, and a new Development Plan was in preparation (for the period 1979-83).

On the whole the selection of Sri Lanka seems resonable. Perhaps the only advers comments regarding this period of work, concerns the rather long voyages involved between one survey area and the next (Pakistan - Mozambique - Seychelles - Sri Lanka), but this was probably unavoidable.

Survey execution.

The shelf around Sri Lanka was extensively covered at three different seasons. A considerable amount of information has been acquired of the shelf area and its fish stocks. The total biomass was estimated to be in the area of 400 - 500 thousand tons (excluding the northern shallow waters). Of an estimated maximum sustainable yield in the region of 250 thousand tons, of which 80 thousand tons represent large demersal and semi-demersal fish, the resource distribution and composition indicated a potential for development mainly in small scale fisheries. The resource findings were negative for any large scale investment in a trawler fleet.

Methodology.

In general, the methodology of the survey was considered satisfactory. A comment was raised that more effort

might have been devoted to fishing trials with locally used methods - e.g. long-lining and dredging for marine molluscs etc. Given the allocation of time for the overall survey of Sri Lankan waters, and the period needed to complete the basic programme, little time remained for these extra trials, but a genuine effort was made to do as much as possible, and this was confirmed by de Bruin.

Communication.

Opinions differed on this aspect for the period before and during the surveys. Some of the younger local scientists/trainees felt they were excluded from real participation, and it was generally considered that they were given only a short time for preparation and probably barely adequate briefings. However de Bruin, the senior local scientist, was fully satisfied with the opportunities he was given both in planning the work programme and with his role during the cruises.

Postsurvey communication and follow-up was greatly assisted by the "round-table" meeting which enabled even the non-technical participants to appreciate most of the implications of survey findings.

Quality and relevance of reporting.

Judging from the range of comments, reports were both too technical for people like planners and administrators etc. to fully comprehend, and also lacking in refinement for some of the local researchers.

Again it was expressed a need for an additional section, written in non-technical language, to draw attention to the principal findings and conclusions and identify their consequences for national planning purposes.

As regards the comments of research workers seeking additional information, it is considered that this should be provided as necessary on an ad hoc basis by means of direct correspondence between the local and IMR scientists concerned.

As noted earlier, the follow-up round table meeting resulted in a general appreciation of the survey and its results, and unquestionably contributed to the manner in which these results have been used by Sri Lanka in planning and implementing subsequent fisheries development.

Use of the resource information.

The information has been used by the Ministry of Fisheries directly when formulating its "Master Plan", and in follow-up research and gear development trials by NARA staff assisted by FAO Bay of Bengal project personnel. In a fisheries development plan for the Hambantota District NORAD has used the resource findings to suggest further exploratory fishing in the area. There is little doubt that the material will continue to be used for several years to come as the base data for Management for Sri Lankan fisheries and as a reference by lending agencies and others when considering proposals for fisheries investment. It seems to be certain that the availability of the survey results was a major cause of the government's decision to show caution in its plans for expansion of the fishing fleet, particularly of the larger sized classes of vessels.

There is general agreement in Sri Lanka that a further R/V "Dr. F.N." type survey will be required, although opinions differed slightly as regards timing. The majority view favours scheduling the next survey in 2/3 years time.

Fisheries administration.

Sri Lanka is one of the few countries in the world where the fisheries sector has been organized at the governmental level within a Ministry for the Fisheries. All other institutions related to fisheries is under the authority of the Ministry. This organizational form makes the fisheries administration more integrated than in many other countries. The institutional barriers, and the problems with the dissemination of information described elsewhere, is not likely to occur in this structure. The fact that Sri Lanka was able to take immediate action based on the survey information from R/V "Dr. F.N." and elsewhere, is an indication of a decision-making structure which are able to respond quickly to changing conditions.

A history of failed public enterprise in fisheries might have left some doubt as to the likelihood of efficient use of the survey results, but the subsequent fishery sector action by the Ministry have proved more effective than might have been anticipated.

C.5. Pakistan, 27th-30th November 1982.

Officials interviewed:

Mr. Mohammed Hashim Leghari,	Asst. chief, Planning Department, Ministry of Food, Agriculture and Co-operatives, Islamabad
Dr. A. S. Akhtar,	Joint Secretary, Lifestock Division, Ministry of Food, Agriculture and Co-operatives, Islamabad
Dr. Haleem Ul Hasnain,	Member (Animal Sciences) Pakistan Agricultural Research Council, Islamabad
Mr. Masood A. Burney,	Director of Fisheries, Govt. of Baluchistan
Mr. Inayat Ullah Khan,	Director, Marine Fisheries Department, Karachi
Mr. Shamsuddin Qureshi,	Asst. Director, Marine Fisheries Department, Karachi
Mr. Mohammad Arshad,	Ass. biologist, Marine Fisheries Dept.
Mr. Sied Masoom Tirmiza,	The Vice-chancellor of the University of Karachi
Prof. N. Tirmizi,	Director of the Institute of Marine Biology, University of Karachi
Dr. Muzammil Ahmed,	Professor, Institute of Marine Biology, University of Karachi
Dr. J. Ali Kahn,	Ass. Professor, Institute of Marine Biology, University of Karachi
Dr. S. Makhdoon Hussain,	Ass. Professor, Institute of Marine Biology, University of Karachi
Dr. S. M. Shamsul Hoda,	Ass. Professor, Institute of Marine Biology, University of Karachi
Ms. Iffat Naeem,	M. Phil. student, Institute of Marine Biology, University of Karachi
Ms. Furqana Chaghati,	M. Phil. student, Institute of Marine Biology, University of Karachi
Mr. N. Sümer,	UNDP Deputy Resident Representative, Islamabad
Mr. J. C. Phillips	FAO Representative, Islamabad

Mr. W. Brandhorst,	Chief Tech. Adviser/Resource Dev., FAO
Mr. N. P. Van Zalinge,	Resource Management Adviser, FAO
Mr. Bjorn A. Bjarnsson,	Project Coordinator, FAO
Mr. T. Watson,	FAO Master fisherman
Mr. Skogstad,	Attaché, The Royal Norwegian Embassy, Visa section, Islamabad
Mr. Oddmund Dahle,	Attache for Drugs, The Royal Norwegian Embassy, Islamabad

Selection of country surveyed.

R/V "Dr. Fridtjof Nansen" conducted pelagic fish assessment surveys in Pakistan waters under the FAO/UNDP Indian Ocean Fishery Development Programme during 1975/76.

In 1975 NORAD made a proposal to Pakistan offering assistance for the development of marine research at the University of Karachi combined with applied fishery research as a basis for fishery development. As a part of this effort R/V "Dr. F.N." surveyed Pakistan waters from January to June 1977.

Survey execution.

Five complete coverages of the Pakistani waters were made. The estimated total biomass showed a large seasonal fluctuation dropping from 1.3 million tons in January to 0.3 million tons in June, the reduction being mainly caused by a drop in the pelagic fish biomass. A large biomass of mesopelagic fish was also found in this survey. These resources are largely unused.

Researchers at the Institute of Marine Research, University of Karachi, and the staff at the Directorate of Fisheries, Karachi, participated in the survey programmes. These researchers collected hydrographic and fish resource data. Extensive sampling of plankton and

collection of species were undertaken at the request of these researchers. At the stage of knowledge of the fish resources and the primary and secondary production in Pakistan waters, this part of the surveys was regarded as very important. The researchers have also used the data for further research and educational purposes.

Reporting and follow-up.

Part of the final report was to be compiled by the Pakistan counterparts. For a number of reasons, this plan for reporting has not been carried out. Firstly a lack of resources needed for this kind of work became evident, e.g. skilled manpower, technical capabilities etc. Secondly, organizational difficulties posed major obstacles both for the reporting as well as for other follow-up activities. A total lack of communication between the Directorate in the Ministry and the Marine Research Institute at the University of Karachi made the pooling of scarce resources impossible. Accordingly, no division of labour and responsibilities could take place. As a result files were not available where needed, logs from the surveys were missing etc. Added to this, and a part of the same problem, came some difficulties with communication between research groups in Karachi and the Marine Institute in Bergen.

A UNDP/FAO conference on the surveys in the North Western Arabian Sea under the Indian Ocean Programme, was held in Karachi in 1978. This conference was attended by participants and observers from eleven countries as well as FAO and the IMR, Bergen. The marine researchers were satisfied with the conference, but as the main theme of the conference was about pelagic resources for a whole region, the conference was of limited immediate value for the purpose of fisheries development in Pakistan.

A joint NORAD/Pakistan workshop on the organization and planning of fishery and marine research was arranged in Bergen in June 1978.

A basis for the discussion was the report "Survey Results of "Dr. Fridtjof Nansen", January - June 1977. Joint NORAD-Pakistan Project, Fish Assessment Survey, Pakistan Waters". This workshop also discussed the development of marine science education, training of personnel for marine research, further processing of the data from R/V "Dr. F.N." surveys in Pakistan waters and further cooperation between Karachi - Bergen. The plans agreed on have not been carried out, except for two NORAD scholarships which enabled two scientists from Pakistan to visit the Marine Institute in Bergen.

Actual and planned use of the resource information, collection of species and reports from the surveys.

The survey data has been used for planning purposes. A summary of the conclusions in the R/V "Dr. F.N." report was used as documentation in the preparation of the fisheries chapter in "The Fifth Plan 1978-83", produced by the Planning Commission, Government of Pakistan. The survey data has also been used in an Asian Development Bank report for the Baluchistan province and a FAO-report.

A number of research reports have been produced on the basis of the survey data. Especially the collection of oceanographic data and the sampling of species were extensively used. These reports identify the species collected during the surveys, and analyse their distribution, abundance, growth rate and spawning seasons etc.

For commercial purposes the survey data were reportedly used as a basis for licensing and for joint-venture operations.

It was generally agreed that further surveys would be welcomed, specially for the coverage of seasonal variations.

Despite these indications of use of the survey data, and despite the fact that there has been follow-up activities from NORAD and the Marine Institute in Bergen, the implementation of fisheries development can not be regarded as successful. The main reason for this is to be found in weaknesses in the administration of the fisheries sector as a whole.

Fisheries administration.

The fisheries sector is administered at the governmental level by the Lifestock Division within the Ministry of Food, Agriculture and Co-operatives, in Islamabad. It should be noted that the fisheries sector is a marginal one within the Ministry's range of activities. This is highlighted by the fact that investment in the fisheries sector in the Fifth Plan 1979-83 is only 2.4 per cent of the total investment programme for the Ministry.

The Marine Fisheries Department of the Federal Government is located in the Fishing Harbour, Karachi. This department is an advisory unit for the Ministry in Islamabad. The Marine Fisheries Department is also supposed to do applied research, but has so far lacked skilled manpower. The Marine Fisheries Department is responsible primarily for the deep sea fisheries (outside of 12 miles from the coast) and for training.

The administrative system is complicated further by the fact that each provincial government has its own Fisheries Department. The maritime provinces, Sind and Baluchistan, both have their Fisheries Departments located in Karachi. These provincial departments are responsible

for the coastal fisheries up to the 12 mile limit, and also for the onshore facilities, statistics etc.

The Institute of Marine Biology, University of Karachi, is engaged in basic research related to marine fisheries. As mentioned earlier they were able to and still continue to take advantage of the R/V "Dr. F.N." survey data for further research at their own institute. It should also be mentioned that the University vice-chancellor expressed interest in extending the education to include applied fisheries research. The future prospects for this is however highly dependant on collaboration between the institutions responsible for fisheries development.

There is an obvious need for a coordinating unit in the administration of the fisheries sector in Pakistan. The lack of coordinating forces in the fisheries sector is clearly an obstacle for implementation of any fisheries development project.

C.6. Kenya, 1st-4th and 9th-10th December 1982.

Officials interviewed:

Mr. Norbert Odero,	Director of Fisheries, Department of Fisheries, Ministry of Tourism and Wildlife
Mr. S. O. Allela,	Director, Kenya Marine and Fisheries Research Institute, (KMFRI), Mombasa
Mr. Enock Wakwabi,	Research Officer, KMFRI
Mr. Mbwana,	General Manager, Kenya Fishing Industry, Mombasa
Mr. E. Mwakilenge,	Provincial Fisheries Officer, Provincial Fisheries Dept., Mombasa
Ms. Annie R. Mugane,	Officer, Ministry of Tourism and Wildlife
Mr. G.N. Gichery,	Senior Assistant Secretary, External Aid Dept., Ministry of Finance, Nairobi
Mr. K. E. Kolding,	FAO Representative in Kenya
Mr. Kjell Storløkken,	NORAD Resident Representative
Mr. Aage Samuelsen,	NORAD Ass. Resident Representative

Survey periods: December 1980; August 1982.
Sponsor: UNDP/FAO/NORAD; NORAD.

Selection of country surveyed.

Kenya's waters were surveyed by the research vessel during 12 days in December 1980 and further 12 days in August 1982. The initial (1980) survey was conducted under joint FAO/NORAD sponsorship. FAO asked for a short term assistance from R/V "Dr. F.N.", at that time engaged in the global UNDP/FAO project GLO/79/011 Assessment of the World's Renewable Marine Resources. The 1982 survey was organized under bilateral arrangements agreed upon directly between NORAD and the Kenya Government.

The evaluation team was able to visit the ship briefly in Mombasa on the 4th December 1982 when she docked at the end of a period of survey in Tanzanian waters in preparation for a further survey of the Kenya Section.

Survey execution.

In December 1980, R/V "Dr. F.N." carried out a systematic exploratory trawl survey particularly in the deep waters down to 500 meters depth. Simultaneously an acoustic survey was effected. This operation was partly executed in conjunction with R/V "Ujuzi" operating in shallower inshore waters. At a number of stations comparative fishing was carried out to obtain an impression of the catchrates of the two vessels.

The surveys, which included both acoustic coverage and extensive trawling operations, confirmed earlier estimates of generally low potential for fisheries production, especially of demersal species, off the Kenya coast.

Reporting, follow-up, and utilization.

All the Kenya authorities consulted, acknowledged the important contribution already made by the research vessel to a better understanding of the fish resource situation off the Kenya coast, and in particular the Director of Fisheries, Mr. N. Odero, noted that the findings were of great assistance to him in dealing with proponents of unrealistically optimistic fisheries development proposals. Both he and the Director of Marine Fisheries Research, Mr. S. O. Allela, valued the opportunity provided to place personnel aboard the vessel for seagoing research experience and training, although both also commented that the short notice provided had prevented them from ensuring that the best people for the job could be made available in all cases. In particular, one senior research officer, who had participated on two cruises, was most enthusiastic about the benefits he had gained and the good treatment whilst onboard.

The survey data had been used for further research at the institute, and also for a training course in fisheries research with 30 participants from several developing countries.

As mentioned earlier, the survey information had been useful to the Director of Fisheries in cautioning against over-optimistic proposals. Nevertheless, Mr. Allela doubted whether planners have used the results as much as they should, and he stressed the need for some form of seminar to bring the researchers (including representatives from Bergen) and the planners together to enhance general understanding and appreciation of the situation. This view was confirmed during subsequent discussions with Mr. Mbwana, General Manager of Kenya Fishing Industries Ltd., the principal fishing company in Kenya, who had not received copies of any of the reports or summaries.

All the information from the surveys in December 1980 was immediately made available to the FAO/Kenya team for processing. The final draft from the FAO project was expected to be made available at the end of 1982.

Future needs.

As regards future needs, survey coverage to date can be seen to have dealt with the latter half of the year (August/December) and even that only partially. The Fisheries Department is anxious for future work to examine the situation towards the end of the NE Monsoon period and the onset of the SE Monsoon, namely January/ February and April/May, so as to complete the annual cycle. As before, such coverage should include further deepwater trawling. In addition, because of Kenya's growing involvement in offshore tuna long-lining operations (the two Kenya owned vessels are now producing

between 700 - 1000 tons of large tuna per annum), some acoustic coverage of offshore pelagic stocks within the area bounded by the Seychelles, Mauritius, Comoro Islands and Mombasa would be of particular interest and value.

No specific mention was made of the sea-bed charting work and other hydrological work done on board, but this will unquestionably be of the greatest value in due course.

Note: IMR, Bergen, staff were not very optimistic about the vessels ability to perform cost-effective studies of oceanic tuna stocks on the lines requested by Kenya.

C.7. Somalia, 5th-9th December 1982.

Officials interviewed:

Mr. Abdulkadir Hassan Nur,	Director General of Fisheries, Ministry of Fisheries
Mr. Shire Sudi Mohamud,	Deputy Minister, Ministry of Fisheries
Mr. Mohamoud Omar Asad,	Director General for Management, Ministry of Fisheries
Mr. Sid Ali Abdulle Barre,	President, Somali Italian Fishing Company (SOMITFISH)
Mr. Yusuf A. Nur,	Fisheries Officer, Ministry of Fisheries
Mr. Muridi Ali Salah,	Co-manager, GPR Boat Factory
Mr. Yusuf Omar Ali,	Director, Department of Natural Sciences, Somali Academy of Sciences and Arts (SOMAC)
Mr. Jan Haakonsen,	Research Supervisor, Department Social Sciences, SOMAC
Mr. Aart Udo,	UNDP Deputy Resident Representative
Mr. Arne Bjørgong,	Consul, Royal Norwegian Consulate General
Mr. Ali Sheikh Mohamed,	Consul General of Sweden
Mr. J. Thompson,	Teamleader/Dev. Adviser, FAO
Mr. G. G. Pierconti,	Project Manager, FAO

Survey period: North-West Arabic Sea, Feb. 1975-Nov. 1976.
Oman and Aden Gulf, July-Aug. 1979;
Jan.-Feb. 1980

Sponsors: UNDP/FAO/NORAD

Selection of country and survey execution.

The selection of Somalian waters for surveys was a part of the UNDP/FAO decision to carry out an acoustic survey of the pelagic resources in the North-West Arabian Sea under the Indian Ocean Fishery Survey and Development Programme. Accordingly, the question of effective use

of the survey data was not related to Somalia only, but was related to the Development programme for the region. However, the high priority given to development of the fisheries sector by the Government, certainly posed the need for some kind of resource assessment in Somalian waters. Only one survey had been carried out, by R/V "Zheleznyakov" from August 1970 to October 1981, before the survey made by R/V "Dr. F.N.", during 1975-76.

There is no doubt that the fishery resources in Somalia are underexploited. According to findings, under 10 % of the total estimated potential is presently being exploited (Ali and Haakonsen 1982).

Communication and follow-up.

The communication with the vessel before arrival in Somalian waterswas limited, apart from the formal arrangement to get permission to operate the vessel outside Somalia. Neither FAO, NORAD nor the Institute of Marine Research, Bergen did involve institutions in Somalia at the planning stage for the survey. One reason for this might be the almost non-availability of counterparts in Somalia for fisheries research and fisheries development. At that time Somalia also faced political problems which affected FAO's operation in the country.

Partly due to the lack of research institutions, Somalia was not able to take the opportunity for training of personnel related to the surveys. Only one person, from the Ministry of Fisheries, participated during the surveys, compared with e.g. 5 persons from Yemen (PDRY). Two persons from Somalia participated in the Karachi conference 1978, but the team was not able to meet them because they were no longer present in the country. This is indicative for the low level of continuity among the staff in institutions in Somalia,blamed primarily on the very low levels of salaries paid to government employees in that country.

Given the lack of fisheries research activity both at the basic and applied level, there is an obvious need for follow-up activities. In order to secure that the resource data are used as guidelines for fisheries development, an effort is needed to bring the research report to the knowledge of people responsible for fisheries administration and for development of the fishing industry. A point made by personnel in the Ministry of Fisheries was that national conferences should be held in addition to interregional conferences like the Karachi-conference. Such conferences would be a more effective forum for discussions amongst the institutions in each country, and would secure a broader understanding and give better prospects for application of the resource surveys.

Utilization of the survey results.

The survey data from R/V "Dr. F.N." has nevertheless been used for planning purposes. The findings are referred to in both the three-year plan and the five-year plan. The estimate of fish stocks is also referred to in a development project produced by foreign consultants. The implication for fisheries development is outlined thoroughly in a planning study published in 1979. (White Fish Authority Report no. MD 397 Democratic Republic of Somalia. Fishing Sector Planning Study, March 1979.)

In a recent development project proposal for the northern coast, the resource findings by R/V "Dr. F.N." are extensively referred to (Fisheries Development Ltd. 1982). It was considered by the FAO team leader in Somalia that one of the main reasons for the location of the project was due to the abundant resources found in or near that area by R/V "Dr. F.N.".

If implemented, this project would result in capital intensive fisheries development in a country with little previous experience of fishing. The project has not yet been approved by the proposed funder, the World Bank, nor by the Government of Somalia.

The survey data have also been used by expatriate advisers to the Ministry of Planning.

An interdisciplinary socio-economic/biological research project at the Somali Academy of Sciences and Arts (see Ali and Haakonsen 1982) is located on the north-east coast. According to the leader of this project, one main reason for the choice of location was the findings of R/V "Dr. F.N." of abundant resources in that area, and thereby the possibilities for development of the area.

On the whole it seems that Somalia has attracted interested donors as well as (the team has reason to believe) interested joint venture partners because of the resource findings. Since the surveys were done there has been quite a substantial expansion effort. The developmental effect of this is, however, yet to be seen. The joint venture company (with Italy) is capital intensive and export oriented. The employment effect is therefore limited, although 60 % of the crew members are Somali nationals (most of them previously trained by SOMALFISH, the joint venture company with Soviet Union before 1977). However, out of 10 persons trained in navigation in Italy during 1980, only 2 remained in the fisheries sector. The rest left for other professions.

A FAO/UNDP-interregional project to explore the mesopelagic resources and to test methods of catching them in the North-Western Arabian Sea has been agreed

upon by the Governments of Pakistan, Oman, Yemen (PDRY) and Somalia. It still remains to be seen whether this project will be put into effect, because of the financial problems of UNDP.

Whether Somalia has attracted more vessels on licenced fishing off her coast because of the resource findings, is questionable. In any case, the team was unable to find out whether the fees gained from these ventures were negotiated according to these findings or not.

Several institutions recommended the need for more refined and more detailed figures of the estimated exploitable resources along the coast of Somalia, possibly by R/V "Dr. F.N.".

C.8. Mozambique, 12th-15th December 1982.

Officials interviewed:

Mr. Basulto,	Director of the Fisheries Institute and FAO adviser
Ms. Lilia Brinca,	Marine biologist, Instituto de Desenvolvimento Pesqueiro
Ms. Maria Imelda Sousa,	Marine biologist, Instituto de Desenvolvimento Pesqueiro
Ms. Maria Lizette Sousa,	Marine biologist, Instituto de Desenvolvimento Pesqueiro
Mr. Antonio Silva,	Oceanographer, Instituto de Desenvolvimento Pesqueiro
Mr. Finn Tarp,	FAO Deputy Representative
Mr. Arne Dahlen,	NORAD Resident Representative

Staff at SIDA GRP Boat Building Site

Survey period:	Aug. 77-June 78; Sept.-Nov. 80;	Sept. 82
Sponsor:	NORAD	UNDP/FAO/NORAD - NORAD

Selection of country and survey execution.

The People's Republic of Mozambique has a coastline of 2 500 km, located in one of the highly productive areas of the Indian Ocean. An important shrimp fishery developed in the sixties in addition to the widespread artisanal coastal fisheries.

No research was made of the offshore resources before a trawl survey was carried out in 1976 under bilateral cooperation. The surveys made by R/V "Dr. F.N." 1977/78 provided the first coverage of the offshore resources giving an acoustic estimate of the pelagic fish resources off Mozambique. From August 1977 to June 1978 four complete coverages of the Mozambican coast were performed. The survey programme was carried out under a NORAD-Mozambique agreement. The estimated biomass of small

pelagic fish was found to vary between 170 and 500 thousand tons at various seasons, anchovy at the Sofala Bank being the most important species. The work included a detailed description of bottom conditions and the hydrographic environment. In October/November 1980 a second survey of selected shelf areas was conducted, as a part of a FAO-Mozambique agreement with special emphasis on shrimp stock assessment, by-catch and hydrography. Finally, a third survey was carried out in August/September 1982 under a NORAD-Mozambique agreement.

Communication, reporting and follow-up.

The case of Mozambique demonstrates the importance of the length of survey periods and the repetition of surveys. Regarding communication before surveys, the first survey was mainly planned by the Norwegian researchers. But, as a result of the long survey period, the Mozambique researchers were able to present their viewpoints and wishes as the programme went on. The participation from Mozambique both in planning and excution has been extended over the survey periods 1977-82.

Except for the timing of the last two surveys (both came at a different season of the year than was asked for by the researchers in Mozambique) there were no complaints about the communication or with the way the surveys was conducted.

The Mozambicans expressed a general satisfaction with the reporting from the surveys. The relatively quick production time of the reports (3 to 4 months) enabled the fisheries administration to act with little delay on the basis of the survey data for ongoing planning of fisheries development. Furthermore, two of the researchers from Mozambique participated in the production of the survey reports. This proved to be important not only for

effective implementation of the survey results, but for rather better local understanding of the implications of survey findings than has been the case in most other countries.

Utilization of the survey results.

R/V "Dr. Fridtjof Nansen" has been operating in Mozambique waters longer than in any other country (8 months in 1977/78). The comparatively long presence in one country made it possible to integrate the survey programme of the vessel in plans for fisheries research development and also for fisheries development.

Mozambigue's 10 year development plan was mainly based (as far as fish resources are concerned) on the resource estimates made in the survey reports. The survey reports were the basis for the development of the offshore industrial fishery for small pelagic fish (scads and mackerel).

The first survey report "The Marine Fish Resources of Mozambique" was the starting point for the planning of fisheries research on the small pelagic species. The reports have been used intensively to plan detailed studies of the fish resources and of the oceanography.

Due to the long survey periods it was possible to do more experimental fishing (with different gear) than has been the case in most other countries. Even so, there was still expressed a need for more experimental fishing and for systematic monitoring. More research has to be done on the inshore resources, for which they want a smaller research vessel.

In conclusion, the survey results have made an important contribution for the development of fisheries research and for the exploitation of the marine resources in Mozambique.

C.9. Paris, 16th December 1982.

Interview with:

Mr. G. Everett, FAO Project Leader, East Central Atlantic Fisheries Commision (CECAF), Senegal

West-African surveys, April 1981 - April 1982
Sponsor: UNDP /FAO/NORAD.

Originally the West-Africa Programme was intended to cover both the main northern and southern production systems - Mauritania to Sierra Leone and Congo to Namibia respectively. The surveys during 1981 covered only the northern region, except for a brief cruise also along the shelf into the Gulf of Guinea and south along Gabon and Congo.

Overall Mr. Everett considered R/V "Dr. F.N." as a good project. Concerning the surveys in West-Africa CECAF used a lot of resources, especially related to the authorization from the countries to go into their waters. Because of changes in survey plans, in some instances it was only five to six days available for preparation before the vessel should enter the territorial waters of the countries.

The reason for going to West-Africa was to follow-up a UNDP/FAO project. R/V "Dr. F.N." was one of several vessels operating in the area. In many ways R/V "Dr. F.N." complemented the echo-surveys made by "Capricorn" which was the vessel mostly used in the area. In some instances the earlier estimates were confirmed, but in others there were considerable differences. A seminar in Senegal for discussions of the survey results from R/V "Dr. F.N.", "Capricorn" and otherwise, and the conclusion reached at the seminar will be guidelines for further research in the area.

The survey results from R/V "Dr. F.N." were especially important for Cape Verde, where it was confirmed that the present catches of fish in their waters could be doubled.

As to the reporting of the survey results, it was a problem of interpretation for each country that the reports give estimation of the total biomass for whole regions. The CECAF office translates the survey reports into French before distribution, but more should be done to ensure that reports are understood and the results implemented. Someone should be attached to the project for further analysing, interpretation and explanation of the survey results.

Some problem of expectations from the countries compared to the actual results from surveys was identified. In general, it could be a problem how to get allowances to do surveys in the territorial waters of a country without creating unrealistic expectations concerning the immediate benefit for the country concerned. Some of the countries would like to see more identification and classification of species than the surveys produced.

To the question of the operational cost of the vessel, it should be said that nobody can do it inexpensive. The most important question was rather the operational record of the vessel concerned. Some examples were given of vessels without any effective operational days at sea despite considerable investments made. Taken the operational record of R/V "Dr. F.N." into consideration the cost effectiveness of the project should without any question be regarded as acceptable.

C.10. On board R/V "Dr. Fridtjof Nansen" in Mombasa, 4.12-1982.

Persons interviewed:

Mr. Roald Vindenes,	Captain
Mr. Svein Iversen,	Cruise Leader
Mr. Harald Kismul,	Assistant technician
Mr. Djuvsland,	Fishing master
Mr. Stavenes,	Cook and steward
Mr. Bjørn Bakken,	Instrument chief
Mr. Sigmund Myklevold,	Scientific assistant

R/V "Dr. F.N." docked at the KFIL jetty in Mombasa on the 4th December 1982, and thus provided an opportunity for the team to tour the ship and meet the Captain, crew nembers, the Cruise Leader and a number of scientific staff on board.

As regards the technical work, it is clear that earlier difficulties experienced in applying the acoustic counting techniques originally developed in northern waters for single-species fisheries (mainly herring) to multi-species tropical fisheries have now been largely overcome, by substituting a system of signal calibration using standard sized copper balls as targets, in place of earlier hydrophone systems. The scientists now have much greater conficence in the accuracy and relevance of their findings than was perhaps the case during the initial years of survey operations.

A number of problems of a non-technical nature were noted, however, and are certainly worth recording:

Scientific staff believed in general that national trainees generally got on well whilst on board, and with a few exceptions were able to carry out assigned complementary duties and contribute to the overall survey activities, in areas such as species identification, catch composition and other basic data collection, such

as fish measurements, and hydrographical work etc. Difficulties were noted however in establishing personal relationships with national scientists because of the shipboard working environment with its accompanying noise, motion and lack of off-duty time for quiet discussion.

Time in port between cruises was also generally too short for the Bergen staff to have any opportunity of meeting the national scientists in their laboratories and so gain understanding of national programmes and problems. It does thus appear that an opportunity to establish or develop relationships for mutual collaboration in future years is being missed.

Scientific and other staff on board have little or no involvement in cruise programme planning. Understandably, most prior arrangements have been made by the Bergen Institute in consultation with either FAO or NORAD and have admittedly worked out quite well, other than in regard to the occasional complaint about short notice. Nevertheless, it does seem as if more time should be made available at the start and end of each cruise, to enable cruise staff to discuss with local fisheries administration and research personnel the nature of and outcome of their respective roles on board.

C.11.1. Data collection from the 38 countries served by R/V "Dr. Fridtjof Nansen" surveys.

As has been noted, one of the methods used by the evaluation team was to send a questionnaire letter to fisheries departments and marine scientists in the countries surveyed by the research vessel. The letter was sent to people in each of the 41 countries surveyed prior to the formation of the evaluation mission and hence included countries which were subsequently visited by the mission. By the middle of January, 1983, replies had been received from 16 of the countries. These included four from among the 18 West African countries which at the time that the letters were sent had only received copies of a preliminary report. Lists of the countries contacted and those which replied are shown in the appendices.

Of the total, 3 countries (India, Iraq and Yemen Arab Republic) were not in fact surveyed, but had received reports in consequence of their attendance at the Karachi Workshop in 1978 following the Indian Ocean Programme N.W. Arabian Sea Survey.

The main impressions from the letters are, briefly:

1. Generally very positive towards the work of the vessel, and thankful for the opportunity to get an assessment of the resources in their own waters. In some cases the need was stressed for one or more follow-up surveys within their waters to complete or amplify the picture. It was, however, mentioned that the fact that the vessel could not surveys areas in the inshore waters, limited the usefulness of the survey to some extent.

2. Areas of use are:

- planning, very often the findings of R/V "Dr. F.N." are the only resource assessment available, and therefore of great importance;

- for further research, both basic (at University institutes) and applied (at government fisheries research

institutes). A lot of basic research is needed in the tropical waters, concerning identification of fish, algae and plankton. Specimens and other kinds of data were often collected by local researchers while on board the vessel. Only one country, Morocco, mentioned that the data from the surveys of this vessel is important for comparisons with the work of a national research institute and its research vessel. Their own research efforts are usually described by most other countries as ways of following-up the work of R/V "Dr. F.N.";

- by providing fishermen and both public and private companies with information on fishing areas, on potential production, on bottom conditions etc.;

- for management of the fisheries generally and for management measures being prepared within a new comprehensive fisheries legislation (Sierra Leone);

- for training purposes.

3. This latter point is stressed very much by most countries. It is apparent that the opportunity for training local scientists is widely valued and that the need is greater than was assumed by the group planning the project in 1971/72. There is considerable interest in the opportunities for local scientists to participate on board the vessel and benefit from the granting of fellowship.

C.11.2. Summary of replies from local scientists to the postal enquiery.

Out of 32 local scientists who had stayed on board R/V "Dr. F.N." during surveys, 13 replied to out letter.

The commentaries given by governmental institutions responsible for fisheries development (referred to in the precious chapter) were also repeated by the individual scientists. However, some additional comments were made, and also some slightly more critical.

In some of the countries the surveys triggered off an interest in stock assessment and marine research. In some cases this area of research was also given higher priority.

Concerning the survey results and the reporting it is said to be a problem that the information about the fish resources is given on a too general level. This is especially the case about the interregional surveys in the North West Arabian Sea. The problem of application in one country of survey results for a whole region and assessment of stocks that does not fit in to national borders points to the need for follow-up.

The need for follow-up research is mentioned especially due to lack of full seasonal coverage as well as the limited coverage of shallow water areas.

As to the training received on board, favourable remarks are made about the collaboration with the Norwegian scientists. The opportunity provided for the scientists to be familiar with the acoustic survey method of stock assessment is also appreciated. However, on the training aspect there is some rather critical comments made. Many of the scientists seem to have had unrealistic expectations about the training they would receive in acoustic methods and equipment, expectations which were not fulfilled during a short stay on board.

(NOTE: Similar comments were received from some scientists, but by no means all, in the countries visited by the evaluation team. The scientists best prepared for the stay on board would also by and large be the most satisfied. The problem with short time available for preparation for the scientists should be given more attention in the future, see also section C.10.).

D. SELECTION OF COUNTRIES SURVEYED BY R/V "DR. FRIDTJOF NANSEN".

D.1. Links with ongoing or planned projects by FAO or NORAD.

As originally conceived the R/V "Dr. F.N." survey programme was intended to operate under the auspices of the UNDP/FAO Indian Ocean Programme (I.O.P.) for at least the first four years. The initial period of survey work, from February 1975 until November 1976, was in fact conducted in this fashion, concentration on the N.W. Arabian Sea area and was therefore specifically linked with ongoing IOP activites.

The UNDP/FAO financial problems which came to a head in late 1976 and which resulted in FAO's inability to meet agreed shares of survey costs during 1977, 1978 and part of 1979, also resulted in decisions to run down and ultimately to terminate IOP. NORAD's decision at this time to pay all the costs of continued vessel operation resulted also in a restriction of survey activity to the waters of Indian Ocean countries with whom Norway had bilateral aid agreements, but only in the case of Sri Lanka was there any planned NORAD funded marine fisheries projects. During this period, surveys were carried out in Pakistan, Mozambique, Seychelles, Sri Lanka and Bangladesh, with a short period of jointly funded work in Oman and Burma during July-November 1979.

The resumption of UNDP/FAO funding in 1980, under UNDP arrangements for financing global activities (GLO/79/011) enabled survey work to expand again around the Indian Ocean area and the planning of work in Malaysia, Thailand and Indonesia was undertaken in consultation with the UNDP/FAO South China Sea project. GLO/79/011 terminated on 31st December 1981, and negotiations started for a new global funding under GLO/82/001 to commence in late 1982.

The decision to carry out a West African coastal survey, in association with the FAO Eastern Central Atlantic Fisheries Commission whilst reflecting the global character of UNDP funding arrangements, resulted in the vessel leaving the Indian Ocean where survey coverage remained incomplete in most cases. Work in West African waters extended from April 1981 until April 1982.

Finally, from May 1982 until end of the year, a further period of FAO funding difficulties resulted in R/V "Dr. F.N." returning to the African east coast to carry out bilateral programmes agreed between NORAD and the governments of Kenya, Tanzania and Mozambique. During this period there was a link with the NORAD sponsored marine fisheries and training project at Mbegani, Tanzania.

D.2. Country requests.

Surveys were included in overall programming in a number of instances at the specific request of the country concerned, such as the work in Seychelles, Sri Lanka, Mozambique and Djibuti etc., although in most cases these surveys would have been undertaken at some stage anyway. Country requests were therefore not a major element in the selection procedure.

D.3. Logistic convenience.

A general policy was adopted from the outset, to devote as much time as possible to actual survey work, and therefore to minimise time spent on passage between one survey area and the next. In consequence, some country surveys were undertaken at times which were logistically convenient, e.g. the surveys of Djibuti, Egypt, Tunisia and Algeria which were performed whilst the vessel was enroute from the Indian Ocean to West Africa. In general however, the planning and scheduling of country surveys was designed to cover as many of the seasonal changes as possible, and logistic convenience was therefore only a minor aspect of the selection process.

E. COMMUNICATION WITH SURVEY COUNTRIES.

E.1. Contact with countries prior to survey start.

Several of the countries contacted by the evaluation mission commented on the short notice given prior to the commencement of a survey, which gave little opportunity to select and prepare appropriate local counterpart staff, or to allow for the inclusion of national components into the survey programme (viz. comments by Kenya, Pakistan and Sri Lanka authorities).

The task of pre-survey communication appears, from the reports to have been shouldered mainly by the IMR Director, Dr. Sætersdal, with little or no involvement by cruise leaders. In the case of the West African surveys much of the pre-survey contact was undertaken by the FAO/CECAF office in Dakar in consultation with Bergen, It is appreciated that there are numerous practical difficulties and not much time available, given other regular duties, to perform this role to everyones satisfaction. Nevertheless, from the comments which have been made it does seem that greater effort should be made, as far as possible, to involve national authorities in the planning process with the aim of obtaining optimum benefit from the time and effort employed during each survey period. This might be achieved if opportunities were given for cruise leaders to make preliminary visits to the countries they may be responsible for surveying, some months ahead.

E.2. Communication between ship-NORAD/FAO during survey period.

From discussions in Rome, it was noted that communication with the vessel whilst engaged on a survey or cruise programme was very limited, at least so far as FAO was concerned. It is understood that regular radio contact is maintained between the vessel and IMR Bergen, and it follows that FAO could be notified by telex from Bergen of the vessel's position and general situation, or that forewarning can by given of any problems which may necessitate immediate action by FAO to provide assistance locally, or to clear any changes in programme which may prove necessary whilst the vessel is engaged on joint NORAD/FAO funded operations.

F. PLANNING/PROGRAMMING AND ADMINISTRATION OF SURVEY OPERATIONS.

F.1. Surveys funded jointly by NORAD/FAO.

On the basis of interpretations of existing agreements between NORAD, FAO and IMR Bergen concerning arrangements for planning and implementation of the jointly funded surveys, it appears that the bulk of actions concerning preparation, planning and execution of the surveys have been undertaken thus far by IMR acting almost alone. From the discussion in Rome it is clear that FAO is less than happy with the existing situation and feels it should be more actively involved in the development of actual cruise tracks in advance of each survey, and should certainly be consulted in advance if an original cruise programme is to be substantially altered for any reason.

FAO points out that the results of R/V "Dr. F.N." surveys are only a part of the body of data and other information which together can provide a basis for resource assessment and resource management actions. FAO is itself the principal source of relevant information derived from earlier or parallel work, and FAO staff who are familiar with such work should therefore be part of the regular planning team whenever new surveys are to be discussed and defined. The evaluation mission fully supports this view, in the interests of ensuring that the surveys always advance the state of knowledge and to avoid any danger of duplication of effort.

Hitherto NORAD appears to have had little or no involvement in survey planning and has been content to act as paymaster. This seems wrong in principle, and at the least, NORAD should, we believe, take a more active role by making the planning procedure more formal and taking the chair at all such meetings.

F.2. Surveys funded solely by NORAD.

During those periods when FAO has been unable to meet its funding commitments, and NORAD has taken the initiative to provide 100 % of the survey costs, work has mainly concentrated around those countries which enjoy favoured status as fas as NORAD bilateral aid is concerned, e.g. Kenya, Tanzania, Mozambique and Sri Lanka, etc.

Mozambique and Sri Lanka have particularly benefited from these situations, and in consequence have received the most thorough survey coverage of their fishing grounds of all the Incian Ocean and West African countries. Even so it appears that NORAD has taken too little part in the planning and preparatory work and has been content to leave most of it to IMR Bergen. Once again it is considered that NORAD should take a more active role in this regard, considering the cost and the importace of the work to the countries concerned, and by the more active involvement of both headquarters and country representative staff ensure that all interests, including those of the recipient countries, participate in the planning and preparation of bilateral country surveys.

Such action would help to avoid the criticisms referred to earlier in this report, such as by Sri Lankan marine scientists who argued that there was no prior opportunity allowed for them to contribute or for their views to be taken into consideration during survey planning.

F.3. Roles of the NORAD and FAO country representatives.

a. NORAD Representatives.

NORAD offices were consulted by the evaluation mission in three of the countries visited, and provided an interesting comparison. The office in Colombo was active and very interested both in the research programme itself and in the reactions of the mission. Additionally the Colombo representation had been involved in setting up the "round-table" conference in 1980, which reviewed the work and results obtained from the surveys. This meeting contributed greatly to a wider understanding in Sri Lankan government circles as to the implications of survey findings and the opportunities which they indicate for future development of Sri Lankan fisheries.

The NORAD office in Nairobi was unquestionably very busy with matters arising from NORAD's aid programme on Lake Turkana and elsewhere, and is situated some 300 miles away from the coast. It would, nevertheless, have been desirable for a NORAD representative to have visited Mombasa during the ships stay in port, to promote discussions between ships staff and local fisheries officials, and provide any other assistance which might be needed. In Kenya's case it is perhaps still too early to consider mounting a conference such as that held in Colombo, nevertheless the NORAD representative should be more involved in survey preparation along the line referred to in section F.2 in this report.

In contrast the NORAD office in Maputo appeared to be unable to participate in any follow-up activities related to R/V "Dr. F.N." because of current workloads in other directions. Despite the need for further coverage by R/V "Dr. F.N.", it was not clear that the implications of survey findings were widely appreciated outside the

Ministry Fisheries Secretariat and Institute of Fisheries Research. Thus a case could be made out for seminar/conference similar to that in Colombo to promote wider understanding among the non-technical staff of relevant government ministries and fishing industry management. The differences between the NORAD offices as experienced by the team also relates to the different mode of operation and communication with and within the fisheries administration of each of the countries concerned.

b. FAO Resident Representatives.

In almost all cases, although few if any of the representatives had professional experience of fisheries work, they were well informed about work to date in their particular countries, and an excellent source of information about the current fisheries situation and the institutions and people involved. These offices act as the channel through which reports on jointly funded R/V "Dr. F.N." surveys are conveyed to the respective governments, and there seems little doubt that they would collaborate with NORAD offices if necessary to assist in convening any conferences that were thought necessary. Again, for jointly funded work, the FAO offices would be the obvious channel for arranging preparatory meetings to discuss future survey activity.

G. SURVEY METHODOLOGY AND LIMITATIONS FOR STOCK ASSESSMENT.

G.1. Advantages and limitations of acoustic systems.

(A review of acoustic technology by Professor Kjell Olsen in Appendix 7).

Earlier methods of fish stock assessments were extremely laborious and time consuming, involving sampling commercial catches, larval surveys, fishtagging programmes, large laboratories and many man-years of effort to arise at a conclusion even about a single species. The introduction of the acoustic method, in which echo data are quantified in special analog integrators, enables the total biomass within a particular swept area to be quickly assessed. Concurrent trial fishing by pelagic and demersal trawls provides sample catches from which the species composition of the total biomass can be identified, and thus, in a matter of days, and with some exceptions, the standing stock of fish in the area can be extrapolated by factors relating swept area to the total area of fishing grounds.

Exceptions and limitations include the inability of the equipment to "count" fish lying on or very close to the bottom, or very close to the sea surface, and particularly in the case of R/V "Dr. F.N.", the inabilities because of the size and draft of the vessel to navigate safely through inshore shallow waters.

With respect to the non-surface swimming pelagic species, the acoustic survey method undoubtedly provides more reliable information than is true in the case of surface-swimming ones. In the case of these species, the limitations of the method are more the "fault of" the fish than with the method itself. Many of the species in this category undergo seasonal migrations to the extent that

surveys would have to be carried out during almost every month of the year to be sure of identifying the seasonal pattern of migrations and to enable estimate to be made of that year's total stock abundance. It was primarily to be able to do this under these conditions that the acoustic method was devised in the first place. Roughly speaking, for the species in this category which live in waters of a total depth of greater than about 10-15 m, the accuracy of the estimate of stock abundance is proportional to the intensity of the survey coverage over the course of a 12-month period.

To further complicate the problem for the stock assessment of this category of species, many of them are subject to quite marked annual changes in abundance levels unrelated to changes in levels of fishing effort. To cope with this problem, the surveys should be repeated year after year. The "throughout the year" and the "year by year" survey requirement in even a fraction of the countries visited by the research vessel is clearly beyond the capabilities of that vessel.

This incomplete coverage causes the estimates of fish abundance from acoustic surveys to be negatively biased, and the extent of this bias depends on factors such as fish behaviour, species composition of the particular fish fauna, variable distribution and survey conditions etc. Allowances can and have been made during R/V "Dr. F.N." surveys to adjust for this bias, but these inevitably enlarge the margin of error, especially in any subsequent sustainable yield calculations.

The error can be minimised by the incorporation of data from other sources if those are available - e.g. suitably rigged demersal trawls will sample most bottom species, and visual observations of the frequency, size and distribution of surface schools provide at least some

data on the missing surface stocks. If available, data from other trial fishing and research programmes, and catch data for the corresponding inshore fisheries will also contribute to the build up of an overall picture.

Then, as in the case of the NW Arabian Sea and the West African surveys, the acoustic system, despite its limitations, and for the first time, enables most of the fish stocks of an entire region to be systematically assessed quickly and much more economically than would be the case by any other means.

G.2. Limitations imposed by vessel size.

R/V "Dr. F.N." is 45 m length, with a 1500 hp main engine. She is therefore a sizeable vessel capable of world wide navigation in most weather conditions, but by virtue of her size cannot operate safely in shallow waters close inshore.

In most, if not all of the countries around the Indian Ocean and West African waters which have been surveyed todate, the close inshore waters support very important small-scale or artisanal type fisheries, which are of considerable social and economic significances to the countries concerned, because of the number of people employed and domestic fish supply, especially in rural markets. Many of the fish species caught by artisanal fishermen are found only in shallow waters, and therefore would be missed out of the acoustic survey altogether. Others may occur both inshore and in deeper offshore waters with seasonally variable abundance in the two localities, e.g. as a result of spawning migrations. A good knowledge of the life cycle of such species is therefore necessary if estimates are to be made of total stock size including the inshore grounds. Thus a substantial input of local knowledge is needed, and in some cases will certainly have been provided through the participation of local scientistis on the various cruises and surveys.

Nevertheless, despite these limitations, the results achieved to date are universally recognised as being a very substantial advance in the state of knowledge of the fish resources of most, if not all of the grounds surveyed. Equally clearly, a great deal of work remains to be done in future to complete the picture of seasonal variation in stock abundance and distribution.

Coverage of the inshore grounds during future surveys will be enhanced if greater use can be made of smaller shallower draft research fishing vessels to work in conjunction with the R/V "Dr. F.N.", but if such collaboration is to prove effective more time and attention must be given to advance preparation.

G.3. Benefits and limitations in the use of such survey results to aid the formulation of fisheries development policies and assist commercial management decisions.

A good understanding of the fish resources of a given area, supported by reliable data on the abundance and distribution of at least the main species groups, is a basic prerequisite to any sensible fisheries development policy, but if commercial investment decisions are to be contained within the ability of the fish resources to sustain the resultant increases in catch and effort, there are additional essential requirements.

Each country concerned must develop its capacity to monitor the impact on its fish resources of progressive increases in fishing effort and this implies the need for suitably qualified scientific staff having the necessary laboratory facilities and research vessels equipped to sample the fish stocks and if possible to undertake acoustic survey work on a regular and continuing basis. At present only a few of the countries have this ability although many can undertake at least part of the work involved.

This points to the need for the continued availability of a vessel such as R/V "Dr. F.N." to function on a global basis, undertaking repeated surveys in areas where significant increases in fishing effort have occurred, following the initial survey work, so as to provide the follow-up information which national fishery authorities will need to ensure against excessive fishing effort and resulting over-fishing.

H. REPORTING OF SURVEY RESULTS AND FOLLOW-UP PROCEDURES.

H.1. Content and format of cruise and final reports.

In general it seems that the reports produced by IMR, Bergen, to date provide a comprehensive and thoroughly professional account of the fish resource assessment and other work undertaken during the various cruises to date of the R/V "Dr. F.N.". It is clear that these reports are being used in most of the countries concerned as basic reference documents during any discussions about their resource base for fisheries development. In some cases the reports represent virtually the only relevant information currently available on national fish resources, whilst in others the reports are unquestionably the most comprehensive and systematic account produced so far.

Very few comments of a non-complimentary nature were made regarding report content and these mostly concerned the omission of information such as instrument calibration data from some of the earlier reports, which are now a standard inclusion in later issues. The main comment of substance has been common to most of the countries concerned and is that the reports are highly technical and are therefore to a large extent incomprehensible to staff in departments concerned with planning and other non-technical activities related to fisheries development.

As regards format, and whilst the cover design of final report issues is striking and relevant, it is not immediately apparent, except by reference to small print, which reports relate to work funded jointly by NORAD and FAO as distinct from those funded under NORAD's bilateral aid programme. FAO headquarters staff were clearly unhappy about the reporting procedure to date and consider that joint survey reports should bear a clear identification with the UNDP/FAO project reference, and should furthermore be cleared by FAO particularly as regards sections derived from literature, prior to final printing.

H.2. Incorporation of data from other information sources.

Although the list of references contained in most of the reports appear to be reasonably comprehensive, in some cases there seem to be some fairly startling omissions which no doubt give rise to the FAO concern referred to above. Unquestionably the FAO Fisheries Department library is the most comprehensive single source of reference material for all of the countries surveyed to date and FAO's views would therefore appear valid.

In addition the generally rather brief preparatory phase for most of the surveys to date must also cast doubt on the extent to which locally available reference material and other relevant local contributions can have been reviewed and taken into account during the course of the surveys and report drafting.

Given the importance accorded to these reports by virtually all of the countries concerned, it does behove all involved to ensure that everything is done to make the reports as comprehensive as possible.

H.3. The need for a simplified non-technical commentary.

As noted earlier the reports are, and quite rightly, highly technical in nature dealing as they do with very complex situations. However, the principal justification for the whole survey programme is the extent to which the work contributes to the process of rational fisheries development in the countries bordering the Indian Ocean and West Africa. Properly planned fisheries development involves many people additional to the research scientist and fisheries technologist, and some means is required whereby the implications for development of the survey findings can be clarified for the benefit of the non-technical personnel involved.

It is proposed that each report in its present format should be accompanied by a simplified summary and commentary in which attention can be drawn to these implications, be they cautions regarding limited resources, or assurances where it is clear that underexploited stocks have been identified.

Responsibility for the production of such commentaries could be assigned to one of the parties, or failing that special arrangements may be needed for this role to be funded by NORAD and/or FAO. The need is very urgent since it concerns most of the reports already produced as well as others in draft or which may be produced in future.

H.4. The seminar/conference option to disseminate survey results more widely.

In addition to the report commentary discussed above, there have already been occasions when a specially organized conference can be the most effective means of disseminating survey results and implications to a wider audience. Examples have been the FAO/NORAD workshop on the fishery resources of the North Arabian Sea held in Karachi in 1978, and the round-table conference in Sri Lanka which was initiated by NORAD.

It is believed that similar seminars or conferences will be required in other countries in due course, and one of the first could be Mozambique, although they need not be restricted to single countries.

I. UTILIZATION OF SURVEY RESULTS BY RECIPIENT GOVERNMENT AND INSTITUTIONS.

I.1. In fisheries research.

A major problem in most of the developing countries is a low capacity for the dissemination of information. This is especially true in the case of research results reported in scientific language of a highly technical nature. In some of the countries we visited capable of understanding and interpreting these reports there are marine researchers of a high professional standard, whereas in others, no qualified people were available. Clearly, for some research groups the survey data has been used as basic data for further research. This was the case in Pakistan, Mozambique and Kenya.

Especially in the University of Karachi, Pakistan, the surveys have been partly related to the development of an extensive fisheries research programme. Also in Mozambique the marine researchers have been increasingly involved in the planning and implementation of the surveys, and in the interpretation of the results and an expressed aim of the next survey is the expansion of fisheries research in Mozambique.

Some marine researchers have benefited from the surveys by participating on board the vessel; the amount of benefit is, however, largely dependent on the duration of the participation. Some have also taken part in the preparation and production of survey reports.

The survey data has also been used for educational purposes. In Pakistan the data were used in the teaching/research programme, e.g. several students have used the data as a basis for their theses. In Kenya the survey results were used in a training course in fisheries research with 30 participants from several developing countries.

In conclusion, the survey results have been utilized for fisheries research and the surveys have also in some instances contributed to the development of marine research in general. The extent to which this has happened has been highly dependent on the existence of national counterparts, and their level of competence. So far, no utilization for fisheries research can be expected in countries like Somalia where fisheries research is non-existent.

I.2. In fisheries development.

It goes without saying that the potential for fisheries development is greatest in countries which have their own fisheries research institutions. It should however also be said that fisheries research development is not equivalent to fisheries development. This is especially so because of the lack of applied research in most developing countries. This means that the gap between research and its application is even larger in developing countries than in developed ones.

The dissemination of research information for application for fisheries development should therefore be expected to be a difficult process. This is even more so because of the institutional barriers between research institutions and governmental institutions responsible for fisheries development. In certain countries there is no communication whatsoever, and in others there are communication problems because of institutions which are barely on speaking terms. Very often one of the most important requirements for institutional cooperation is lacking, namely an agreed sphere of competence divided amongst them. In other words, dissemination of information horizontally amongst the institutions cannot always be assured. This makes a strong argument for mechanisms which can bring institutions together and also for follow-up activities for the purpose of dissemination of information.

I.3. In fisheries planning.

a) In most countries it was reported that the stock assessments made by R/V "Dr. F.N." are used in the general development planning. That is: they are used as guidelines for the development prospects in the fisheries sector compared to other sectors of the national economy. After the establishment of the 200 mile economic zones (EEZ) many countries clearly had an overoptimistic expectation of the fish resources that would be available for exploitation. In many instances therefore, stock assessment inside the EEZ proved to be negative information in the sense that the assessment could not match the expectations. A case in point is Burma where huge investments were made five years before R/V "Dr. F.N." estimated the resources to be very much below the target set for the original developments plans. As a result of the R/V "Dr. F.N." surveys and commercial results, the plans are currently under revision.

Another example is Sri Lanka where development plans were revised as a result of the survey data from R/V "Dr. F.N.". Also in Kenya were the survey results negative in the sense that the fish resources proved to be less abundant than expected and they were important in deterring over-investment in deep sea fisheries.

The evaluation team has also learned that Sumatra reduced its plans for investments in purse seiners as a result of the stock assessment made by R/V "Dr. F.N.".

In conclusion, the survey data are of basic importance for setting realistic targets for fisheries development and especially in offshore fisheries.

b) When it comes to fisheries development plans in their more elaborated form the usefullness of the survey data is more complicated. Firstly it should be stated that references to the use of the R/V "Dr. F.N." survey data can be seen in most of the fisheries development plans for the countries visited. In that respect the data are widely used. The plans include information concerning the identification of the different fish resources, their size and distribution etc. In other words, the plans normally take advantage of the information in the reports about what and where concerning the fish resources.

Secondly, when it comes to the how questions, several requirements have to be fulfilled before the survey data can be utilized effectively. The question of how to exploit an identified fish resource brings us to the question of the state of the fishing industry and to the usefulness of the survey result for commercial purposes.

I.4. For commercial purposes.

In a couple of instances the team was informed that the management of the state owned fishing company had not seen the survey report, nor were they informed about its content. Again, this is indicative of the problems mentioned earlier with institutional barriers and the dissemination of information. It also stresses the need for follow-up activities.

In order to extend the usefulness of the stock assessment data there is a need for monitoring and for experimental/ commercial fishing in most of the countries. The capabilities for taking advantage of the knowledge about the size of fish resources are generally limited, and have normally to be furnished from outside. As the team was told: "Now the Government tell us to go out and catch the fish R/V "Dr. F.N." has located off our coasts but we lack the manpower and technology to do this". The lesson to be learned from this is of course that the probability for use of the stock assessment data for commercial fisheries development, depends to a large extent on the presence or otherwise in the country of a development agency project related to the marine fisheries. In the absence of a FAO, NORAD or other agency fisheries development project, the utilization for commercial purposes seems to be mainly through allocation of quotas licensing or joint ventures with other countries. The development effect to national economies and employment prospects of such activities is however questionable indeed.

The most significant use of the survey results by the industry occurred in the cases where an expansion of the offshore fishing fleet was deterred because of the evidence made available by the survey vessel. The survey results were reported to have been valuable in other respects as well especially in providing governments with charts showing the configuration of the sea bottom so that potential trawling grounds could be identified.

J. MAJOR CONCLUSIONS AND RECOMMENDATIONS.

J.1. Future use of the vessel.

1. In all of the countries visited it was clear that there was a wish for the vessel to do further work and there are similar indications in the letters from the other countries. From our assessment of the work to date there are clearly gaps in the seasonal coverage. In order to fill gaps and follow-up requests a two to three years programme was identified. Subsequent to this period a review of the project could be undertaken.

2. Throughout the eight years of operation the vessel has been very competently and effectively operated. There are no indications that the vessel should not be able to operate as effectively in the next four to five years.

3. In the absence of the survey data countries including Indonesia, Sri Lanka and Kenya, and possibly others, might, and in some cases almost certainly would, have launched into considerable investment plans of offshore fleet expansion. The annual costs and even the total cost to date of operating R/V "Dr. F.N." are relatively small compared to the savings accruing from this. The savings of these developing countries are of course impossible to quantify, but could easily add up to hundreds of millions of dollars against which the annual costs and even the total costs to date of operating R/V "Dr. F.N." have been relatively small.

It is also unquestionable that R/V "Dr. F.N." has provided most of the countries concerned with a more systematic assessment (and sometimes the only assessment) of the extent of the fish resources available within their waters, and thereby is contributing to plans for rational development of the fisheries to the benefit of the recipient countries.

4. The team recommend that the survey research project "Dr. Fridtjof Nansen" should continue, given regards to the recommendations in the evaluation report.

J.2. Main objectives of the project.

According to the FINAL REPORT OF THE WORKING GROUP FOR THE FAO/NORAD FISHERY SURVEY VESSEL, dated 15th January 1970, the main objectives of the R/V "Dr. F.N." project were:

> "The main tasks will thus be related to the survey and appraisal of resources, and the assessment of their catchability".

i) The first and major objective for the operation of the vessel, appraisal of resources, has to a large extent been fulfilled. Within the limits imposed by the vessel's size and range of operation and by general limitations of the acoutic method, the execution of surveys is regarded as being of a high professional standard. For a discussion of the limitations, cf. section G and Appendix 7 (difficulties in estimating the composition of multi-species stocks, in measuring schools close to the surface, close to the bottom and close to the coast). Secondly, the effect of seasonal fluctuations is not fully covered in some areas.

ii) The other main task of the project, assessment of the catchability of the resources, has been fulfilled to a limited extent only. For a number of reasons this objective has been secondary to the overall main objective of stock assessment. Firstly, the vessel is best equipped, and is best suited for stock assessment. The experimental fishing has mostly been for identification and the estimation of the composition of fish stocks. Secondly, acoustic surveys and experimental fishing can not easily be undertaken concurrently, and given the often strict time limits there are clearly rational arguments for using the vessel for acoustic surveys, for which it is best suited.

In the FINAL REPORT it was stated:

"As a secondary task, training may be undertaken".

iii) The training objective of the project has been followed up extensively. The comments received from the trainees have been mainly favourable, but in a few cases critical. The recipient countries generally very much appreciate the training opportunity, given that lack of qualified manpower is a major constraint on development. The team is however, of the opinion that "familiarization" is a better descriptive concept for the type of training given on board, because of the highly technical nature of the work and the very limited periods that any one trainee can spend on board. The value of the training on board the vessel is highly dependant on the length of stay, on previous qualifications of the trainees and on the preparation time and briefing given before joining the vessel. These factors should be taken into account when selecting persons for participation on board. Young researchers often felt somewhat left out of the operation. Extra training effort might only be possible if an extra staff member is added to the IMR team on board. If the local personnel is given more time for preparation as well, the barriers created by being "outsiders" would diminish.

J.3. Reconsideration of objectives and structure of decision-making.

The evaluation team recommend that the aims and the objectives of the project should be reconsidered and redefined in regard to the achievements and the experiences during the 8 years of operation.

The two principal parties, FAO and NORAD should agree on these. It is also recommended that current negotiations regarding funding should be completed as soon as possible. Regardless of the sharing of the operational costs of the vessel between NORAD and FAO, it is recommended that they should reach an agreement for the assignment of responsibility amongst the institutions involved in the project.

J.4. Associated vessel.

The results of the R/V "Dr. F.N." surveys provide only part of the data which together with the other existing information can provide a basis for resources assessment and fish catchability. As a consequence of the inability of R/V "Dr. F.N." to operate in shallow waters and the uncertainty related to estimation of stock near the bottom and on the surface, consideration needs to be given to associating R/V "Dr. F.N." with a smaller local inshore going research - or even a commercial vessel in the country concerned in order to get reliable data of the inshore area as well. The estimation of these stocks on the basis of offshore data for the same stocks is questionable.

Providing such a vessel is of course subject to local availability of suitable vessels. If the fisheries authorities can be encouraged to collaborate with R/V "Dr. F.N." in this manner, the likelihood of active involvement and interest of the authorities in applying the survey results in practical and constructive ways will improve.

Currently most of the fisheries in developing countries take place in the coastal zone. In order to get good estimates of the inshore resources the method of engaging an additional smaller vessel is necessary. The developmental effect of this method is obvious, and the value of the work of R/V "Dr. F.N." will increase substantially if it can be adopted.

J.5. Reporting.

For scientific purposes the reporting and presentation of data is adequate and prepared in a very competent manner. By itself, the availability of scientific data does not lead to fisheries development and management. This can not be expected without a follow-up of some sort given the capacity of the recipient country in question. In general, the follow-up of the surveys has not been adequate. The team was informed that the results were frequently referred to in planning documents. There were, however, shortcomings in the understanding of and in the distribution of the reports. These follow-up shortcomings became more critical after the run-down and demise of the Indian Ocean Programme. During and after this period there appeared to be no assigned responsibility for the follow-up work. Such follow-up as has recurred since the demise of IOP has depended more on individual initiative rather than preplanning.

As stated in section H, there is a need for a commentary report, where the findings from the surveys are given in an applied form, that is, the implications of the scientific findings for the fisheries planning and management are explained. The technical type of report being distributed hitherto, does not provide the information in an easily digestible form to enable the governments to use it for fisheries development. The team identified a strong need for the preparation of an additional series of reports to perform this task. The existing reporting system has not encouraged requests for follow-up action such as seminars etc. from the recipient governments, as indicated by the team's observations that many government offices had given little attention to the reports until the evaluation team asked for their comments on the use/usefulness of the reports.

In some cases it was found that there is no mechanism for an automatic information flow between institutions, and it should be assumed that there is a need for a follow-up in the absence of any evidence to the contrary.

Ideally this commentary report should be produced in the language of the country concerned, and preferably in collaboration with local staff.

J.6. Follow-up.

The team strongly recommend that the follow-up activities be extended and upgraded. FAO should bear a greater responsibility in this respect generally and NORAD as well in countries where there are NORAD-offices.

Having regard to FAO's current staffing and financial situation and to enable FAO to play a significant role in the project, we recommend that NORAD should include provisions under funds-in-trust arrangements for the purpose of follow-up action.

The responsibility for follow-up should be assigned to one position/person, working on a full-time basis. A prime role for this person would be to act as liason between FAO-NORAD-the Marine Institute and the survey country, follow up reporting, arranging seminars, preparing the ground for the survey etc.

Recipient countries also have a responsibility for follow-up action, but their ability to perform in this respect will vary considerably one from another. Planning and preparation for each new survey should therefore give more attention to country capability for follow-up implementation.

J.7. Concentration of effort.

Although the vessel was designed with the capacity to operate in all climates around the world, in practise it has operated initially in the Indian Ocean, from Mozambique northwards round to Indonesia, and subsequently off the West African coast. This represents a very large area to be covered by a single vessel even for stock assessment work, and an almost impossibly over-large area for any realistic expectation of influencing fisheries development in all the countries concerned, particularly since following the demise of IOP there has been a lack of regular follow-up arrangements.

Evaluation of the work of R/V "Dr. F.N." to date shows that the effect of FAO's funding difficulties and the subsequent provision of finance under UNDP global arrangements has been to divert the vessel away from a concentrated effort in the Indian Ocean. Significant parts of the Indian Ocean coastline have received only partial survey coverage in terms of seasonal variations in fish stock abundance and distribution - e.g. Pakistan, Bangladesh, Burma, Malaysia, Thailand and Indonesia surveys.

It is concluded that the most effective use of the vessel will result from completing the coverage in particular areas before surveying new ones. Thus the most immediate task should be to fill in the existing gaps in survey coverage of those Indian Ocean countries, so as to complete the overview picture of fish resources, followed by concentration for more detailed studies of particular stocks or areas of greatest promise and potential for development identified during the initial overall survey - e.g. North West Arabian Sea stocks of mesopelagic fish.

Only when this work is complete should the vessel be moved to other parts of the world. It is recognised that this conclusion seems to conflict with the stated aims and areas for operation now being proposed (see section F.4 on page 5 of the UNDP project document referenced GLO/82/001/A/01/12). However, it does appear that the timing and duration of operations by R/V "Dr. F.N." in the various proposed survey areas is flexible and should therefore allow for an orderly and more systematic approach along the lines indicated above.

There are many reasons why effort should be concentrated, a most important one being that of securing the integration of the work of R/V "Dr. F.N." to the development of fisheries in the recipient countries.

K. APPENDICES

1. Terms of reference for the evaluation mission
2. Comments to the terms of reference made by Mr. Kojima, Fisheries Department, FAO
3. Persons interviewed in Norway, FAO, Rome, and in the six countries visited
4. Countries contacted and replies received during the postal enquiry, including the letter of enquiry
5. Survey assignments R/V "Dr. Fridtjof Nansen" 1975-1982
6. The fisheries sector in the six countries visited
7. Acoustic abundance estimation of fish, a critical review of its limitations and advantages
8. Agreement between FAO and NORAD
9. Contract between FAO and Institute of Marine Research, Bergen
10. Documents consulted.

TERMS OF REFERENCE

for the evaluation of the activities of "Dr. Fridtjof Nansen".

I. Background

The fishery research vessel "Dr. Fridtjof Nansen" was designed and built in 1974 for scientific and exploratory investigations of fishery resources of developing countries, under a joint plan with the Fisheries Department of FAO based on a funding of operation to be shared by FAO and Norway.

The Institute of Marine Research, Bergen has under a sub-contract with NORAD, been responsible for the operation of the vessel, and the intention has been to conduct the various research programmes jointly with the relevant fisheries research organizations in the countries concerned.

After 7-8 years of operation, NORAD is particularly interested in evaluating the results achieved by using the vessel and the follow-up work in the recipient countries.

II. Participants, Mode of work

As members of the evaluation team, NORAD has appointed:

Abraham Hallenstvedt, Professor Political Science (team leader)
Robert W. Ellis, Marine Biologist
C. E. P. Watson, Fishery Development Adviser

Evaluation Division, NORAD has the responsibility for the evaluation. The team will receive administrative support from the Evaluation Division. As secretary to the team NORAD has appointed:

Kirsten Bjøru, Sociologist.

The evaluation will be based on case studies in a selection of the countries where resource surveys have been carried out. This selection shall cover countries where the vessel has conducted surveys on behalf of FAO as well as countries where surveys have been carried out on a bilateral basis with Norway.

Before and after the field work, the team will meet for plenary discussions.

The team should also interview relevant staff members of FAO, NORAD and the Norwegian Institute of Marine Research.

III. Tasks of the evaluation team

The evaluation team shall:

1) Discuss the procedures for selection of survey countries, both with regard to bilateral and multilateral programmes, and assess if this selection has been reasonable regarding registration of needs and likelihood of efficient use.

2) Assess if the communication with the survey countries, before, during and after the surveys, have been adequate.

3) Discuss the administrative set-up and division of responsibilities between FAO, NORAD and the Norwegian Institute of Marine Research, regarding operation of the vessel and the arrangement of surveys and final reports.

4) Discuss the relevance and adequacy of survey methods including the follow-up with the national fisheries authorities of the recipient countries.

5) Assess the quality and relevance of the reports and the form of presentation applied in the final reports, and report on the actual or planned use of the resource information in these reports in the elaboration of fisheries plans or for other purposes.

The main emphasis on the evaluation will be on issue 5). The discussion of the remaining subjects should be geared towards a meaningful answer to issue 5), in order to evaluate the end-use of the information collected by R/V "Dr. Fridtjof Nansen" in the countries surveyed.

IV. Reporting

The Evaluation Report is to be submitted to NORAD no later than one month after the termination of field visits. The Report shall contain general conclusions on the issues listed under III, based on annexed country reports.

Nils Vogt
Ass. General Director
NORAD

Appendix 2

Comments to the terms of reference made by Mr. Kojima, Director, Operations Service, Fisheries Department, FAO (telex 13th of October 1982):

"Agree in general background and your choice consultants.
Regarding tasks suggest following be noted:
§ 1. In discussing prosedure for selection of surveys/ countries team should take into consideration research needs, financial constraints and Norwegian preférences.
§ 2. No comment.
§ 3. Review rather than discuss.
§ 4. Should probably read "report on changes made in survey methodology as a result of experiences gained and how changes were communicated to fisheries authorities in recipient countries and FAO".
§ 5. We think should be limited to "assess the quality and relevance of the reports and the form of presentation of final reports to recipient countries".
Introduce § 6 to relate to the evaluation of actual or planned use of the reports and recommendations by recipient countries, NORAD and FAO.
Therefore main emphasis will be on § 6.
No other comments."

PERSONS INTERVIEWED IN NORWAY, FAO AND THE SIX COUNTRIES VISITED.

FAO, Fisheries Department, Rome, 15th and 16th November 1982

Mr. N. Kojima,	Director, Operations Service (FIO)
Mr. M. J. Mann,	Senior Project Operations Officer, Africa Group (FIO)
Dr. H. D. R. Iyengar,	Senior Officer,Trust Funds (FIO)
Mr. C. M. Monrufet,	Assistant Fleet Manager, Fleet Management Unit (FIOF)
Mr. I. J. B. Robertson,	Senior Fishery Industry Officer, Fishery Industries Division (FII)
Dr. Armin Lindquist,	Director, Fishery Resources and Environment Division (FIR)
Mr. S. C. Venema,	Fishery Resources Officer, Marine Resources Service (FIRM)

Burma, 18th-22nd November 1982

Captain (Navy) Sein Tun,	Managing Director, Peoples Pearl and Fishery Corporation (PPFC)
C. Yin Chang,	Director, Foreign Loans Department, PPFC
U Sein Maung,	Deputy General Manager/Advisor Foreign Loan Project Department, PPFC
Dr. Sann Aung,	Scientist, Marine Fisheries Resources Survey and Exploratory Fishing, PPFC
Lt. Comdr. Han Tun (BN),	General Manager for the Marine Production, PPFC
U Khin Maung Latt,	Director General, Planning and Statistics Department, Fisheries Department Ministry of Agriculture and Forests
U Sein Lwin,	Statistics Officer, Planning and Statistics Department, Fisheries Department, Ministry of Agriculture and Forests

Ohn Kyaw,	Marine Superintendent (MS) Production, PPFC
U Tha Htun,	Asst. General Manager Production, PPFC
Mr. Erling Dessau,	UNDP Resident Representative
Mr. Jacob Guit,	UNDP Deputy Resident Representative
Mr. Oscar J. S. Lazo,	FAO Representative in Burma
Mr. Davidson Thomas,	FAO Project Leader
Dr. Leo Rijavec,	FAO Team Leader/Survey Specialist

Bangkok, 23rd November 1982

Mr. J. Fitzpatrick,	Fleet Manager, Fleet Management Unit (FIOF), Fisheries Department, FAO, Rome

Sri Lanka, 24th-26th November 1982

Mr. Claude Fernando,	Director of Planning and Programming Division, Ministry of Fisheries
Mr. Thurirajah,	Deputy Director, Department of Planning and Programming, Ministry of Fisheries
Mr. Wewelwella,	Director of Development Division, Ministry of Fisheries
Dr. Onil Perera,	Director General, National Aquatic Research Agency (NARA)
Mrs. Dianutha,	Research Officer, Marine Biologist, NARA
Mr. M.S.M. Siddeek,	Research Officer, Population Dynamics and Statistics, NARA
Mr. K.T. Weerasooriya,	Research Officer, Gear Technologist NARA
Mr. M.P. Wickremasinghe,	Secretary, Ceylon Fisheries Corp.
Dr. G.H.P. de Bruin,	Senior Scientist, Marine Biology
Several Fisheries Inspectors, Colombo DFEO Division	

Mr. Istvan Ozorai,	FAO Representative in Sri Lanka
Mr. E. Dingstad,	NORAD Resident Representative
Mr. Tore Selvig,	NORAD Ass. Resident Representative

Pakistan, 27th-30th November 1982

Mr. Mohammed Hashim Leghari,	Asst. chief, Planning Department, Ministry of Food, Agriculture and Co-operatives, Islamabad
Dr. A. S. Akhtar,	Joint Secretary, Lifestock Division, Ministry of Food, Agriculture and Co-operatives, Islamabad
Dr. Haleem Ul Hasnain,	Member (Animal Sciences) Pakistan Agricultural Research Council, Islamabad
Mr. Masood A. Burney,	Director of Fisheries, Govt. of Baluchistan
Mr. Inayat Ullah Khan,	Director, Marine Fisheries Department, Karachi
Mr. Shamsuddin Qureshi,	Asst. Director, Marine Fisheries Department, Karachi
Mr. Mohammad Arshad,	Ass. biologist, Marine Fisheries Dept.
Mr. Sied Masoom Tirmiza,	The Vice-chancellor of the University of Karachi
Prof. N. Tirmizi,	Director of the Institute of Marine Biology, University of Karachi
Dr. Muzammil Ahmed,	Professor, Institute of Marine Biology, University of Karachi
Dr. J. Ali Kahn,	Ass. Professor, Institute of Marine Biology, University of Karachi
Dr. S. Makhdoon Hussain,	Ass. Professor, Institute of Marine Biology, University of Karachi
Dr. S. M. Shamsul Hoda,	Ass. Professor, Institute of Marine Biology, University of Karachi
Ms. Iffat Naeem,	M. Phil. student, Institute of Marine Biology, University of Karachi
Ms. Furqana Chaghati,	M. Phil. student, Institute of Marine Biology, University of Karachi
Mr. N. Sümer,	UNDP Deputy Resident Representative, Islamabad
Mr. J.C. Phillips,	FAO Representative, Islamabad
Mr. W. Brandhorst,	Chief Tech. Adviser/Resource Dev.,FAO

Mr. N. P. Van Zalinge,	Resource Management Adviser, FAO
Mr. Bjorn A. Bjarnsson,	Project Coordinator, FAO
Mr. T. Watson,	FAO Master fisherman
Mr. Skogstad,	Attaché, The Royal Norwegian Embassy, Visa section, Islamabad
Mr. Oddmund Dahle,	Attaché for Drugs, The Royal Norwegian Embassy, Islamabad

Kenya, 1st-4th and 9th-10th December 1982

Mr. Norbert Odero,	Director of Fisheries, Department of Fisheries, Ministry of Tourism and Wildlife
Mr. S. O. Allela,	Director, Kenya Marine and Fisheries Research Institute, (KMFR), Mombasa
Mr. Enock Wakwabi,	Research Officer, KMFR
Mr. Raphael Nzioka,	Senior Research Officer, KMFR
Mr. Mbwana	General manager, Kenya Fishing Industry, Mombasa
Mr. E. Mwakilenge,	Provincial Fisheries Officer, Provincial Fisheries Dept., Mombasa
Ms. Annie R. Mugane,	Officer, Ministry of Tourism and Wildlife
Mr. G.N. Gicheru,	Senior Assistant Secretary, External Aid Dept., Ministry of Finance, Nairobi
Mr. K. E. Kolding,	FAO Representative in Kenya
Mr. Kjell Storløkken,	NORAD Resident Representative
Mr. Aage Samuelsen,	NORAD Ass. Resident Representative

Somalia, 5th-9th December 1982

Mr. Abdulkadir Hassan Nur,	Director General of Fisheries, Ministry of Fisheries
Mr. Shire Sudi Mohamud,	Deputy Minister, Ministry of Fisheries
Mr. Mohamoud Omar Asad,	Director General for Management, Ministry of Fisheries
Mr. Yusuf A. Nur,	Fisheries Officer, Ministry of Fisheries
Mr. Muridi Ali Salah,	Co-manager, GRP Boat Factory

Mr. Yusuf Omar Ali,	Director, Department of Natural Sciences, Somali Academy of Sciences and Arts (SOMAC)
Mr. Jan Haakonsen,	Research Supervisor, Department Social Sciences, SOMAC
Mr. Sid Ali Abdulle Barre,	President, Somali Italian Fishing Company (SOMITFISH)
Mr. Aart Udo,	UNDP Deputy Resident Representative
Mr. Arne Bjørgong,	Consul, Royal Norwegian Consulate General
Mr. Ali Sheikh Mohamed,	Consul General of Sweden
Mr. J. Thompson,	Teamleader/Dev. Adviser, FAO
Mr. G. G. Pierconti,	Project Manager, FAO

Mozambique, 12th-15th December 1982

Mr. Basulto,	Director of the Fisheries Institute and FAO adviser
Ms. Lilia Brinca,	Marine biologist, Instituto de Desenvolvimento Pesqueiro
Ms. Maria Imelda Sousa,	Marine biologist, Instituto de Desenvolvimento Pesqueiro
Ms. Maria Lizette Sousa,	Marine biologist, Instituto de Desenvolvimento Pewqueiro
Mr. Antonio Silva,	Oceanographer, Instituto de Desenvolvimento Pesqueiro

SIDA GRP Boat Building Site

Mr. Finn Tarp,	FAO Deputy Representative
Mr. Arne Dahlen,	NORAD Resident Representative

Paris, 16th December 1982

Mr. G. Everett,	FAO project Leader, East Central Atlantic Fisheries Commission (CECAF), Senegal

On board R/V "Dr. Fridtjof Nansen" in Mombasa, 4.12 1982

Mr. Roald Vindenes,	Captain
Mr. Svein Iversen,	Cruise Leader
Mr. Harald Kismul,	Assistant technician
Mr. Djuvsland,	Fishing master
Mr. Stavenes,	Cook and steward
Mr. Bjørn Bakken,	Instrument chief
Mr. Sigmund Myklevold,	Scientific assistant

The Institute for Marine Research, Bergen

Mr. Gunnar Sætersdal,	Director
Mr. Rolf Sælen,	Operational Manager
Mr. Roald Sætre,	Scientist
Mr. Tore Strømme,	Scientist

NORAD, Oslo

Mr. Ole Andreas Lunder,	Head of Fisheries Division
Ms. Vigdis Langsholdt,	Senior Officer, Fisheries Division

NORAD
Direktoratet
for utviklingshjelp

Norwegian Agency for International Development

To the Ministry of:

Deres ref
Your ref

Vår ref GLO 001
Our ref

Dato 27.9.1982
Date

Dear Sirs,

EVALUATION OF THE REPORTS FROM R/V "DR. FRIDTJOF NANSEN".

On behalf of the Norwegian Agency for International Development (NORAD), an evaluation and assessment of the use of the reports from the research vessel "Dr. Fridtjof Nansen" will be conducted during the autumn of 1982.

Since 1975 the vessel has been at the disposal of FAO/UNDP as we as for bilateral use for NORAD.

During the research programme since 1975 the objectives of the u of the vessel have been to collect information on the compositio and abundance of the fish resources to obtain information on catch rates and availability of fish to the gears used, and for training of local scientists.

In order to assess the use of the reports from these surveys it necessary to collect information from the respective countries. this early stage of the evaluation we would like to receive some preliminary information on the use of the reports in Your countr in order to consider a selection of countries to be visited by t evaluation team later on in the autumn.

"Dr. Fridtjof Nansen" made surveys in your waters during under a joint /FAO/UNDP project. We need some information o whether the reports from the survey(s) in any respect have been use to Your country, and how they have been used.

Areas of use:
- Fisheries Development Project
- Fisheries Development Plans
- By commercial agencies, foreign or domestic (direct in fishing in gear application etc.)
- By specific governmental institutions or agencies (inclusive o collaboration with international agencies and/or joint venture with commercial agencies).
- For further research programme
- For further training/educational programmes

Postadresse:
Boks 8142 Oslo Dep
Oslo 1

Kontoradresse:
Fridtjof
Nansens vei 14
Oslo

Telefon:
02-46 18 00

Telegramadresse
NORAD, Oslo

Telex:
16548 NORAD-N

Bankgiro:
6054 05 03012

Postgiro:
17290

Please add to this list of areas if and when applicable. Each area is not exclusive of the others. Information on any planned use of the reports in the future, and by which institution/office will be welcomed.

We regret to give such short notice, but we would very much appreciate a prompt reply to our letter, and not later than by the middle of october.

The address of the evaluation team is:
c/o The Evaluation Division, NORAD, address as above.

Looking forward to hearing from You.

Yours sincerely

Kirsten Bjøru
for the Evaluation team

Copy: The UNDP office in

COUNTRIES CONTACTED AND REPLIES RECEIVED DURING THE POSTAL ENQUIRY.

Recipient country	Governments	Local scientists
Somalia	x	
Yemen (PDRY)		
Oman		
Pakistan	x	
Iran		x
India *)		
Yemen Arab Republic *)		
Iraq *)		
Mozambique	x	x
Seychelles		
Sri Lanka	x	x
Burma	x	
Bangladesh	x	x
Malaysia		
Thailand		
Indonesia		x
Kenya	x	
Tanzania	x	x
Djibouti	x	
Egypt	x	x
Tunisia		
Algeria	x	x
Morocco	x	x
Cape Verde		
Mauritania		
Senegal	x	
Gambia	x	
Guinea-Bissau		
Guinea		x
Sierra Leone	x	
Liberia		x
Ivory Coast		
Ghana		
Togo		
Nigeria		x
Cameroon		
Equatorial Guinea		
Gabon		
Congo		x
Benin		
Sao Tome and Principe	x	

*) India, Iraq and Yemen Arab Republic did not receive the servides direct of the R/V "Dr. F.N." but participated in and received reports of regional findings at the Karachi workshop in 1978 following the North-West Arabian Sea surveys, as member-countries of the Indian Ocean Programme.

Survey assignments R/V "Dr. Fridtjof Nansen", February 1975 to December 1982. Source: Institute of Marine Research, Bergen, Nov. 1981.

	PERIOD	ASSIGNMENT	SPONSORS
1.	Febr 1975-Nov 1976	North-West Arabian Sea(Somalia, PDRY, Oman, Pakistan)	NORAD/UNDP/FAO
2.	Jan-June 1977	Pakistan	NORAD
3.	Aug 1977-June 1978	Mozambique	NORAD
4.	July 1978	Seychelles	NORAD
5.	Aug/Sep 1978	Sri Lanka	NORAD
5.	Apr/June 1979	Sri Lanka	NORAD
6.	July/Aug 1979	Oman and Aden Gulfs	NORAD/UNDP/FAO
7.	Sep/Nov 1979	Burma	NORAD/UNDP/FAO
8.	Nov/Dec 1979	Bangladesh	NORAD/UNDP/FAO
9.	Jan/Feb 1980	Sri Lanka	NORAD
10.	March/Apr 1980	Burma	NORAD/UNDP/FAO
11.	May 1980	Bangladesh	NORAD/UNDP/FAO
12.	June/Aug 1980	Malaysia, Thailand, Indonesia	NORAD/UNDP/FAO
13.	Sep/Nov 1980	Mozambique	NORAD/UNDP/FAO
14.	Dec 1980	Kenya (trawl survey)	NORAD/UNDP/FAO
15.	Jan/Feb 1981	Oman and Aden Gulfs	NORAD/UNDP/FAO
16.	March 1981	Djibouti	NORAD/UNDP/FAO
17.	March 1981	Egypt	NORAD/UNDP/FAO
18.	March 1981	Tunisia	NORAD/UNDP/FAO
19.	April 1981	Algier	NORAD/UNDP/FAO
20.	Apr 1981-Apr 1982	West Africa *)	NORAD/UNDP/FAO
21.	June/July 1982	Tanzania	NORAD
22.	Aug 1982	Kenya	NORAD
23.	Sep 1982	Mozambique	NORAD
24.	Nov 1982	Tanzania	NORAD
25.	Dec 1982	Kenya	NORAD

*) See next page

ble 1

Operational features on the surveys off West-Africa.

uise	Location	Dates	Days at sea	Distance travelled in survey area	Numbers fishing stations	Hydro-graphic stations
1	Cape Blanc - Cape Verga	25/4 - 26/5-81	29	4600	114	46
2	Cape Verga - Cape St.Paul	1-25/6-81	23	4450	86	40
3	Togo - Congo	4/8 - 3/9-81	23	3340	65	16
4	Bissagos Islands - Cape Blanc	4-30/9-81	25	4020	80	34
5	Cape Verde Islands	3/11 - 2/12-81	22	2700	43	27
6	Mauritania	4-14/12-81	10	2100	19	20
7	West-Sahara	15-19/12-81	4	740	-	-
8	Sherbo Island - Cape Blanc	8/2 - 17/3-82	34	6180	96	39
9	West-Sahara	17-20/3-82	3	750	-	-
0	Cape Bojador - Agadir	20/3 - 5/4-82	16	1860	9	-
otal survey time, distance in survey area and stations orked			189	30740	511	222
ay-up of vessel, days			119			
ransfer of vessel, days and distance			10	4750		
nexpected stop due to repair			10			
ays in period 25/4-81 - 5/4-82			345			
ays in harbour except from lay-up and repair			17			

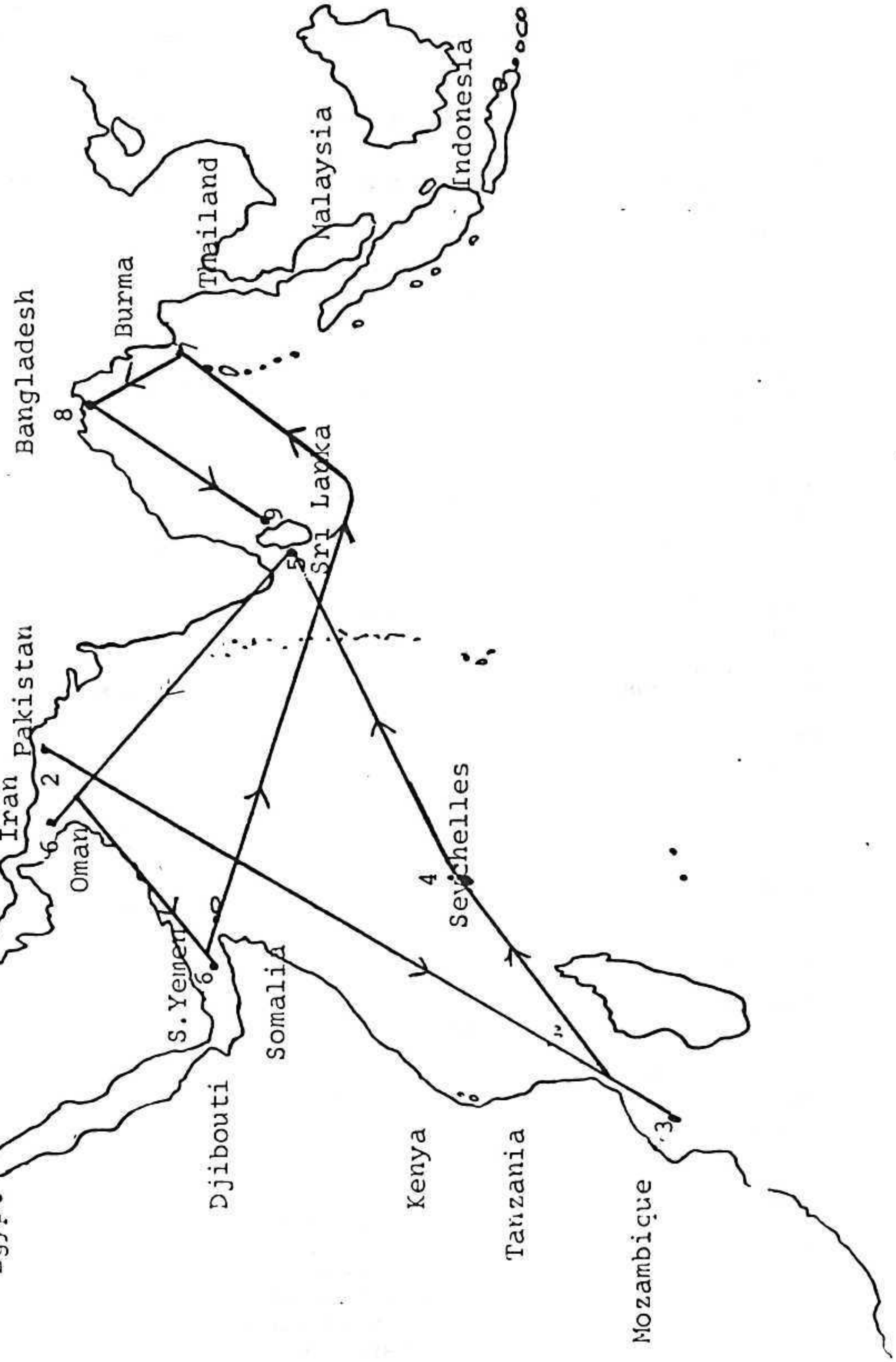
Source: Institute of Marine Research, Bergen

Table 2. Seasonal and Geographical Coverage by the Surveys between April, 1975, and December, 1982. Source: Institute of Marine Research, Bergen, 1981.

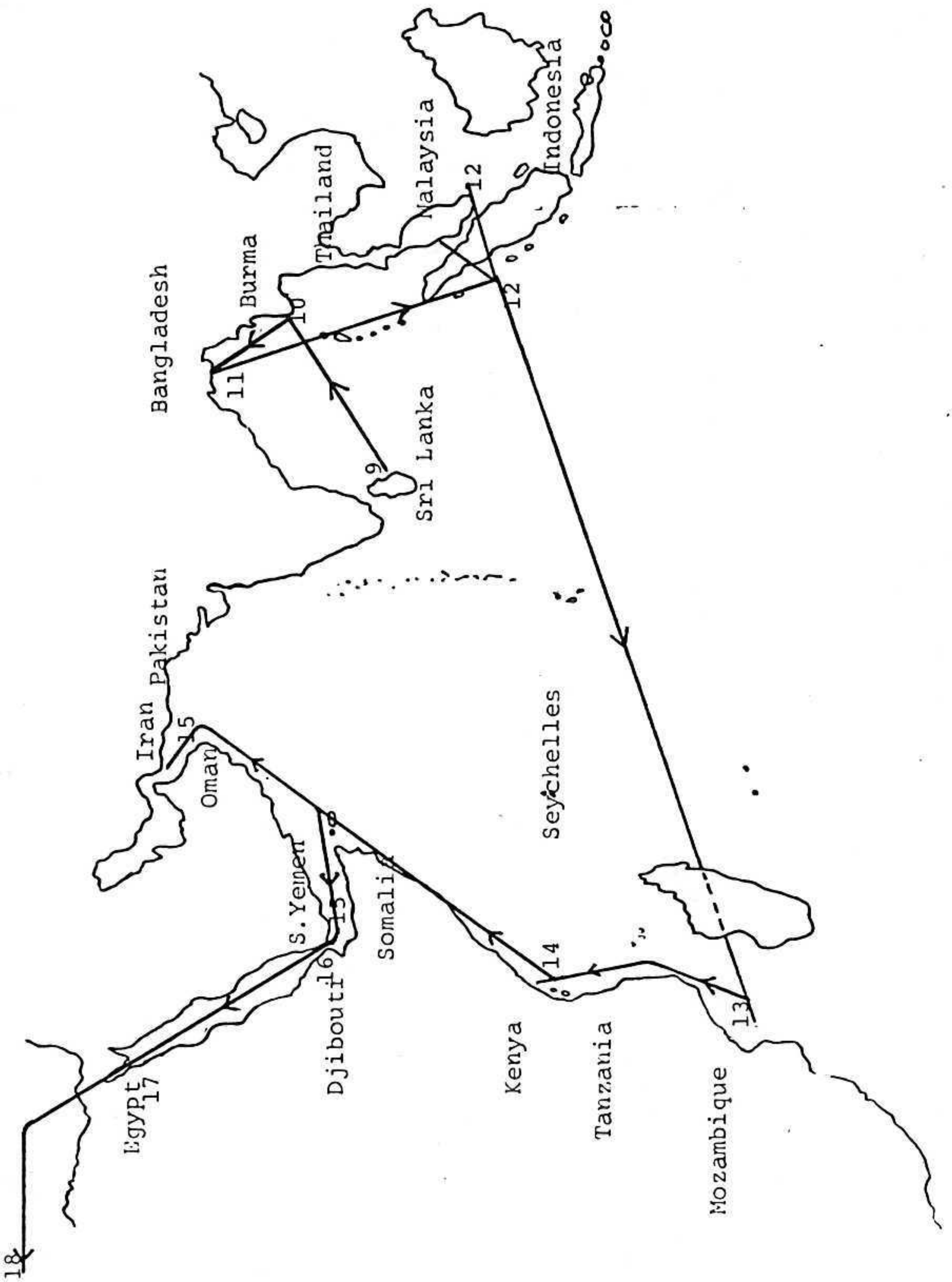
Country or region	Spon-sor 1)	Days of Survey	Months of survey J F M A M J J A S O N D	Local Scientists (man-months) On board	IMR 2)
N.W. Arabian Sea					
Feb 75-Nov 76	M	383	x x x x x x x x x x x x	30	
Mozambique					
Aug 77-Jun 78	B	218	x x x x x x x x x x x x	19	4
Oct/Nov 80	M	41	x x	5	3
Sep 82	B	30	x	3	
Pakistan					
Jan-June 77	B	132	x x x x x x	26	12
Sri Lanka					
Aug/Sep 78 Apr/June 79 Jan/Feb 80	B	104	x x x x x x x x	12	6
Burma					
Sep/Nov 79 March/Apr 80	M	102	x x x x x	24	3
Oman and Aden Gulf					
July/Aug 79 Jan/Feb 81	M	91	x x x x	3	
Bangladesh					
Nov/Dec 79/May80	B	29	x x x	2	3
Seychelles					
July 78	B[3]	12	x	1	
Kenya					
Dec 80 4)	M	12	x	1	
1982	B	24	x x	3	
Tanzania					
1982	B	49	x x x	7	
Malaysia, Thailand, Indonesia,					
June/Aug 80	M	67	x x x	12	
Egypt,Tunisia					
March 81	M	16	x	1	
Algeria					
April 81	M	6	x	½	
West Africa					
May 81/	M	189	x x x x x x x x x x x x		
April 82			x x x x	17	

1) B - 100 % bilateral sponsoring from NORAD
M - multilateral FAO/UNDP and NORAD funding
2) Fellowships at Institute of Marine Research, Bergen
3) There is no bilateral agreement between Seychelles and Norway
4) Trawl survey

Map 1. Cruise track from the Jan.-June 1977 survey in Pakistan (2) until the Jan/Feb. 1980 survey in Sri Lanka (9).



Map 2. Cruise track from the Jan/Feb. 1980 survey in Sri Lanka (9) until the March 1981 survey in Egypt (17).



BURMA.

The marine fisheries sector of the economy.

FISHERIES DATA (Available statistics). Source: FAO Country profile, Burma 1980 and FAO Yearbook of Fisheries Statistics 1979.

Commodity Balance (1978):

	Production	Imports	Exports	Total Supply	Per Caput Supply
	'000 tons liveweight				kg/year
Fish for direct human consumption	470.1		6.0	464.1	13.8
Fish for animal feed and other purposes	70.4			70.4	
Marine areas only	396.1				

Estimated Employment (1977):

(i) Primary sector: about 142,000 full-time fishermen, plus over 200,000 engaged part-time

(ii) Secondary sector: not available

THE STRUCTURE AND CHARACTERISTICS OF THE INDUSTRY

Marine operations account for a little over 70 percent of the total national catch, the Tenasserim district (near to the border with Thailand) being the major fishing area; the waters off the Irrawaddy Basin and the Arakan area, close to Bangladesh, are also of importance. More than 90% of marine fish landing is reportedly provided by artisanal fishermen.

Almost all of the fish produced in Burma is consumed within the country although small quantitites of prawns are exported.

However, fresh fish, both freshwater and marine, is only available in close proximity to the source of production and virtually all fish that is marketed across division or state boundaries (except from Irrawaddy to Rangoon) is traded in processed form; present estimates are that 75 percent of the total catch is salted, dried or smoked or converted into fish paste.

Recently the PPFC has begun a distributive system for frozen marine fish upcountry on a moderate scale. Apart from this, however, there is very little fish conservation practised with modern means. Hardly any ice is used, cold storage facilities are minimal and markets are generally poorly equipped to maintain the quality of fish offered for sale. The extent of losses due to these factors is not known but is probably not high due to the vigorous demand and short marketing channels.

Official statistics record Burmese fish production as increasing at a rate of 2.6 percent per year throughout the seventies and while this is possible on the basis of the marine resources available, most observers consider the actual increase to be less than this. In the marine fisheries some progress has been made with the mechanization of craft and gears and in the technical training of fishermen, but there has been little development in the sense of expanding the range and nature of fishing operations. At the same time deficiencies in landing, storage, processing, transport and marketing facilities continue to be serious constraints.

The fishing industry is of considerable importance in the economy of Burma; fish and fish products play an important dietary role throughout the country accounting for well over one third of animal protein supplies, as well as providing a means of livelihood for a fairly large section of the populace. On the other hand, fish presently has little or no impact on Burma's external trade, exports being limited essentially to prawns and pearls and imports confined to small quantities of dried products, principally canned items.

DEVELOPMENT OF OFFSHORE FISHERIES

Offshore trawling started in 1953. During the last ten years the development of offshore fishing has been given a high priority by the government of Burma. The motive consisting partly of need for higher foreign exchange earnings (from shrimp fishing), partly of increasing the internal supply of fish to cover the high domestic demand.

In the development of her fisheries, Burma has received considerable assistance from the Asian Development Bank since 1973. On the basis of catch rates from the PPFC trawlers covering only a few fishing grounds, the ADB team in 1973 made a preliminary estimate of a maximum sustainable yield of fish resources in Burmese waters of about 117.000 m. t. per annum (Asian Development Bank 1974). This figure also formed the basis for an ambitious plan (of 1976) to expand the Burmese fishing fleet, operated by the PPFC, to some 100 modern fishing vessels, mainly trawlers. These plans have been persistently implemented with the help of international financing. The main suppliers of the investment capital, mainly through loans affected "in naturam", i.e. through the delivery of vessels, equipment and machinery/ installations, have been the Asian Development Bank, Norway, Australia, UK and Denmark.

One might talk about overcapitalization with respect to an uneven development/follow-up of complementary activites. This industrialization programme soon met difficulties, especially in lack of manpower and expertise, insufficient fuel quota etc. The influx of new manpower have been insufficient to enable full deployment of the fleet, and in addition PPFC has been continuously losing trained manpower to the merchant marine. During the period March 1980 - March 1981 22 operational vessels (out of a total of 80 vessels) had an average of only about 60 days at sea per vessel. Some of the vessels operate as fish carriers, or floating freezer plants mainly collecting fish from fishermen of the private sector. In addition to their own production PPFC purchase fish and shrimp from the artisanal/ small-scale fishermen in the private sector. This activity provides PPFC with a lucrative sideline and accounts for the bulk of export of fish products of the company (Ben-Yami 1982).

SRI LANKA.

FISHERIES DATA. Source: FAO, Fishery Country Profile, Sri Lanka 1979; Ministry of Fisheries, Sri Lanka, Progress 1977-81; FAO Yearbook of Fisheries Statistics 1979.

Commodity Balance (1978):

	Production	Imports	Exports	Total Supply	Per Caput Supply
	'000 tons liveweight				kg/year
Fish for direct human consumption	155.6	12.2	4.6	163.2	11.4
Fish for animal feed and other purposes	1.0	-	-	1.0	
Marine areas (1978)	139.8				

Production by sub-sector:	1977	1979	1981	
Coastal	123.4	146.5	172.0	(estimated)
Deep Sea and off-shore	0.3	2.1	2.0	
Inland	12.9	17.2	28.0	
	136.6	165.8	202.0	

Estimated Employment (1978):

(i) Primary sector:	67,000
(ii) Secondary sector:	14,000

The Sri Lanka fishing fleet remains predominantly inshore and is operated by five basic types of vessel. Largest of these are thirty recently introduced modern 38 ft mechanized boats, followed in descending order of size by some 2,500 3.5 tons boats ranging in length from 28 to 32 feet. Rather smaller are some 3,400 17.5 ft fibreglass boats fitted with outboard motors; also fitted with outboard motors are some 3,800 indigenous craft;

finally there are some 13,500 small non-mechanized traditional craft not all of which will be active at any one time. In addition five shrimp trawlers and ten offshore and deep-sea trawlers (belonging to the Cey-Nor Foundation and to the Ceylon Fisheries Corporation) plus two tuna longliners are operated (1979).

As early as 1937, there had been experiments in mechanizing traditional craft but mechanization of the coastal fishery really commenced in 1958. The total production of the coastal fishery in 1958 was 40,000 tons, while in 1978 it was 134,744 tons. This three-fold increase is related to the diffusion of new technology in fishing boats and gear. Today, driftnets and gillnets dominate the inshore fishery.

According to surveys conducted by the then Fisheries Research Station, Colombo, and the Institute of Marine Research, Bergen (R/V "Dr. Fridtjof Nansen"), the potential yield from the country's inshore fishery is about 250,000 tons. Of this amount, 80,000 tons represent large demersal or semi-dermersal fish and 170,000 tons represent pelagic fish; some increase over present levels of production are therefore possible (FAO Fishery Country Profile 1979). In the long run, however, scope for expansion of the domestic fish supply, will depend mainly on inland fisheries.

One-third of the animal protein in the Sri Lankan diet is derived from fish. Such alternate sources of animal protein as meat and eggs are generally unacceptable to large sections of the population.

Between 1975 and 1978, fish exports had increased at least twice and foreign exchange earnings by nearly ten times, and in the latter year nearly 4,542 tons of fish (mainly crustacea such as prawns and lobsters) were exported to Japan, U.S.A., Singapore, U.K., the Netherlands, Australia and Germany, earning U.S.$ 15 million in foreign exchange. In 1979, a ban was imposed on the export of lobsters effective from 1 September 1979, following the over-exploitation of the lobster resource.

Development projects in offshore fishing are currently being financially supported by the Abu Dhabi Fund from the United Arab Emirates and by the Asian Development Bank. A number of 34 and 38 footers plus 3½ ton boats are and will be issued on the south west and north west coast.

PAKISTAN

The Marine Fisheries Sector of the Economy.

FISHERIES DATA. Sources: FAO Country profile, Pakistan 1978
FAO Yearbook of Fisheries Statistics 1979
Commodity Balance (1976): Indian Ocean Programme 1978

	Production	Imports	Exports	Total Supply	Per Caput Supply
	'000 tons liveweight				kg/year
Fish for direct human consumption	127.1	0.0	38.2	88.9	1.2
Fish for animal feed and other purposes	78.6	-	51.6	27.0	
Marine areas only	177.2				
Marine areas only (1979)	259.7				

Estimated Employment (1976):

(i) Primary sector: 205 871 of which 100691 full time
In Marine Fisheries: ca. 92 000
(ii) Secondary sector: nor available

THE STRUCTURE AND CHARACTERISTICS OF THE INDUSTRY

The marine fisheries of Pakistan, which account for about 85 percent of the Republic's total catch of fish, consists of coastal operations on two distinct grounds - extending south-east from Karachi to the border with India, the other west of Karachi and along the Mekran coast of Baluchistan to the border with Iran. The former, with Karachi harbour as its base, is characterized by a broad continental shelf and a coastline marked by innumerable creeks and the River Indus delta; the latter, whose coastline is formed by large bays, has a narrow, abruptly descending shelf and many, widely dispersed, small landing places.

The mechanized fleet operating from Karachi and the Sind coast consists (1976 data) of some 1 100 trawlers and 825 launches equipped with gillnets. The trawlers are varied in size, the more modern vessels having a length of 16-20 m, and concentrate upon inshore resources of shrimp. The launches, many of which are mechanized, and the sailing craft also operate fairly close to the shore but exploit a wide variety of species, the most important being redfish, shark and mackerel. Less than two thirds of these mechanized vessels are, however, regularly operational. About 4 000 small sail craft are also engaged in these fisheries. Some 74 100 fishermen are employed in the Karachi/Sind marine fisheries, about one third only part-time or occasionally; the majority of the full-time professional fishermen are members of a single cooperative society with headquaters in Karachi.

The fisheries along the Mekran coast are essentially artisanal, employing some 12 500 full-time fishermen and a further 1 900 part-time fishermen; using about 2 000 small sailing craft and 400 gillnet launches, their varied catch includes a small but growing quantity of shrimp.

Some 40% of the fishermen are engaged in the large-scale but relatively labourintensive fisheries. There is little or no fishing in deeper waters, apart from three 350 tons Republic of Korea trawlers, operating under an agreement with the government of Sind and a Pakistani associate, RCD Traders (International) Limited (Appleyard et al. 1981).

Domestic consumption of fish remains at a very low level, nationally, and geographically unevenly spread, a reflection to a certain extent of the industry's heavy concentration upon export-oriented processing and marketing facilities. The greater part of the marine catch is exported, only about one quarter being consumed domestically. Some 40 freezing, canning, reduction and other processing plants have been established in the Karachi area to handle products for export.

The fishing industry makes a major contribution to the economy of Pakistan as an earner of foreign exchange; imports of fish are negligible, whilst the value of exports of fishery products exceeded US$ 39 million in 1976.

DEVELOPMENT PROSPECTS

In response to credit schemes, Government export incentives and assistance channelled through the Karachi Cooperative, the number of trawlers and of other mechanized craft increased very rapidly, producing a twofold expansion in Pakistan's total marine catch in the space of ten years.

Pakistan's marine fishing activites are presently by and large limited to the intense exploitation of inshore stocks, mainly around Karachi. Except for demersal species along the Mekran coast, these close-to-shore resources are now almost certainly fully exploited and there is an urgent need for the introduction of management measures to conserve the stocks, particularly of shrimp, and for the expansion of operations further off shore.

Improved institutional arrangements (including clearer understanding of the division of responsibilities between the Federal Fisheries Department and the Provincial Fisheries Departments), better methods of fish handling and quality control, the rationalization of existing fleets and processing plants will all be required if future expansion is to be more orderly and efficient.

KENYA

FISHERIES DATA. Source: FAO, Fishery Country Profile, Kenya, 1980; Fisheries Department, Kenya 1982; FAO Year-book of Fisheries Statistics 1979.

Commodity Balance (1979):

	Production	Imports	Exports	Total Supply	Per Caput Supply
	'000 liveweight				kg/year
Fish for direct human consumption (1979)	51.7	2.0	2.4	51.3	3.3
Fish for animal feed and other purposes (1979)	-	1.0	-	1.0	
Total production, import, export 1981	57.4	1.5	14.6	44.3	2.8
Marine areas (1979)	4.1				
Marine areas (1981)	6.0				

Estimated Employment (1979):

(i) Primary sector:	25,000-30,000 of which about
(ii) Secondary sector:	3,500 marine fishermen

Inland fisheries currently account for about 90 percent of total production.

The contribution of marine fisheries to the total fish production in Kenya is still rather small with operations largely at artisanal level and confined to the shelf area close inshore along the coral reef. Beyond the reef and less than three miles off-shore, the water runs to at least 100 fathoms deep except for the North Coast Banks where the 100 fathomline is 5 to 20 miles off-shore. The bottom parts of most of the area are covered with coral out-croppings making bottom trawling rather difficult. The fishing craft include sailing dhows, dugout canoes, out-rigger canoes and other small boats. A very small number of the fishing craft are motorized.

Production has increased steadily over the last ten years from 34,000 tons in 1970 to 51,000 tons in 1979 maintaining a yearly growth rate of about 5 percent. The greater part of this increase is accounted for by the higher catches from Lake Turkana. Production from marine fisheries has remained rather static over the years, until 1979. The last two years (1979-81) increase could be attributed to the increase in number of private companies operating shrimp trawlers, and not the least the deployment of two trawlers by the Kenya Fishing Industries, which landed about 9% of the total production in 1981 (Fisheries Department 1982).

The fishing industry nationally is not of great importance, locally, however, it has an important socio-economic role. The rather low average consumption is somewhat misleading since to one section of the community fish is a staple food item while to another it is still of no significance.

DEVELOPMENT PROSPECTS

The main opportunities for the further expansion of Kenya's fishing industry rest with continued development of the inland waters.

Possibilities of expanded production from coastal marine fisheries seem to be rather less favourable. Although no detailed assessments have been carried out, the inshore waters are believed to be poorer in fishery resources than the inland waters; the same given increase in production from coastal waters will therefore require a greater investment in gear and boats and investment is likely to be attracted more to the inland resources. Marketing prospects are also less favourable with sea fish tending to be more costly than freshwater species, and the smaller coastal population offering a more restricted market.

There is generally considerable demand for fish in Kenya and the limited supply appears to be the principal reason for the low rate of consumption in the country. It is, therefore, believed

that given far greater production and better transport, distribution and marketing infrastructure consumption would undoubtedly rise much faster.

RESEARCH

Following the collapse of the East African Community, Kenya has recently established the Kenya Marine and Fisheries Research Institute (KMFRI) incorporating the research institutions and facilities left over by the defunct Community. KMFRI is fully financed by the Kenya Government and has been charged with the responsibility of conducting and coordinating research in the fields of marine and fisheries sciences under the auspices of the Kenya National Council for Science and Technology. The Institute is currently having two functional research laboratories, the Kenya Marine Research Laboratories based in Mombasa and the Kenya Freshwater Research Laboratories based in Kisumu. KMFRI is, nevertheless, still quite new and still tackling the problems of recruitment, acquisition of equipment and the development of additional facilities.

SOMALIA

The Marine Fisheries Sector of the Economy.

There are no inland fisheries of commercial significance in Somalia, nor is there any prodiction from aquaculture.

FISHERIES DATA. Source: FAO Country Profile of Somalia 1979.

Commodity Balance (1977):

	Production	Imports	Exports	Total Supply	Per Caput Supply
	'000 tons liveweight				kg/year
Fish for direct human consumption	10.2*)	0.0	8.3	1.9	0.6
Fish for animal feed and other purposes	0.3	-	0.3	-	-

Estimated Employment (1977):

(i) Primary sector: 4,000 full-time plus 16/18,000 occasional fishermen

(ii) Secondary sector: nor available

*) Estimated

THE STRUCTURE AND CHARACTERISTICS OF THE INDUSTRY

During the Five Year Development Plan 1974-1978, the fleet of 2,000 huris, jahasas and bedens was increased by some 450 motorised boats of 6-10 metres in length, which were distributed amongst the 21 cooperatives and fisheries resettlement sentres. However, only about a third of these open diesel powered craft were still operational by the end of 1978 because of inadequate maintenance facilities and spare parts. Some 200 of these motor boats came from Sweden, 150 from the USSR and the others from Kenya, Sri Lanka, Italy and Greece. There is also a small boat yard producing glass fibre hulls in Somalia. The traditional artisanal fleet comprises principally of wooden canoes of 3 to 6 metres called "huris", supplemented by some

larger craft of 8 to 10 metres which are sailing boats, though a few have engines. Most of the artisanal fishermen use gill nets or lines.

Fish is one of Somalia's few natural resources, but it was not until the Five Year Development Programme 1974-78 was drafted that a major effort to develop the fisheries sector was initiated.

In the industrial sector, between 1974 and 1977 there was a joint USSR-Somali venture (SOMALFISH) which operated 10 freezer trawlers. These vessels caught about 4,000 tons of deep water lobster and other varieties of fish annually in Somali waters, but were withdrawn by the USSR in November 1977.

SOMITFISH is a Somali-Italian joint venture company, established in 1981. 65% of the company is owned by the Somali government. The company own 2 trawlers (67 metres), built in Italy with Italian credit, but is still in the building-up-phase. Foreign vessels operate in Somali waters under licence, amongst these are 10 Japanese tuna vessels operating currently. No catch rate data are available from the foreign vessels, nor from the joint venture company.

At present the industry's major role is as an earner of foreign currency through export of fish/fish products. Tuna, mackerel and sardines are canned and on the main exported. Production of frozen fish has mainly been for export.

At approximately 0.6 kg per year caput consumption of fish in Somalia is one of the lowest in the world. While tradition and communication considerations have confined the market to certain coastal areas the rising price of meat is diverting some of the demand for animal protein to fish, particularly among the lower income groups. Furthermore, the drive to urbanization is changing old values and habits including the attitude towards fish as food.

The regional significance of fisheries is particularly marked in the north of Somalia where few other employment opportunities exist. Fisheries are also the main activity in the three

Fisheries Resettlement Centres, which support some 16,000 resettled nomads. While the fishing industry makes only a marginal contribution to the Somali economy, it is envisaged that this role will be expanded.

In an attempt to fill the vacuum created by the departure of the USSR in November 1977, a number of countries have offered aid to fisheries development in Somalia. Difficulties arising from lack of technical expertise and infrastructure have created problems for the Somali economy in absorbing all of these aid opportunities and the yearly fish catches have remained virtually the same since 1977 (Ali and Haakonsen 1982).

MOZAMBIQUE

THE MARINE FISHERIES SECTOR OF THE ECONOMY.

Some 40 000 persons in Mozambique are full-time or part-time fishermen.

Estimated fish landings and imports 1981. Source: Andreasson et al. 1982.

	Inland	Marine
Crustaceans		12 000
Fish:		
Industrial fisheries		15 000
Small-scale and semi-industrial fisheries	8 000	20 000
Imported fish		20 000

The potential for further development of inland fisheries seems to be promising. Mozambique devides the marine fisheries into small-scale, semi-industrial and industrial fisheries. The latter is concentrated in Maputo and Beira. The development of the industrial fisheries was initiated in 1960, when a shrimp fishery for export was established. Apart from this, since 1977, industrial fishing consisted mainly of foreign trawlers fishing under licence. Before independence very little was done to develop the fisheries in Mozambique. Since independence a big effort has been made in order to increase the production of fish, with the eventual aim of being self-sufficient. An increase of 20 000 tonnes in fish landed during the period of 1981-85 is indicated in the ten year plan for Mozambique. All sectors of the industry shall contribute in order to reach this goal. The institutions set up to achieve this is highly integrated and regular meetings are held on a weekly basis.

After independence several joint venture companies within industrial fishing have been formed. At the moment 3 such companies exists as well as one pure Mozambican company, all with public interests. These are: MOSOPESCA, joint venture

with the Sovjet Union (this company produced ca. 7 000 tonnes in 1981); PESCAMAR, with Spain; and EFRIPEL, with Japan. All these are operating in the off-shore waters of Mozambique, and are part of the policy of import substitution. The shrimp fishery produces only for export, and is an important earner of foreign currency.

The development strategy is based mainly on fisheries centres and production cooperatives. Distribution of gear and the marketing of fish is done through state companies. As in many other developing countries there is no systematic collection of fisheries statistics except for the catch data from the state companies.

Overexploitation in the Maputo Bay area and the need for diversification of effort towards other species/other areas is of great importance at the moment.

ACOUSTIC ABUNDANCE ESTIMATION OF FISH, A CRITICAL REVIEW OF ITS LIMITATIONS AND ADVANTAGES.

Acoustic fish abundance estimation has commonly been carried out by the use of three different methods, "single fish echo counting", "echo integration" and "school counting". Echo counting is generally effected only when fish can be resolved as individual targets. Echo integration may provide an accurate estimate also at higher fish densities and this technique is the one most commonly used at present. When fish occur in schools, attempts have been made to use sonar for counting numbers of schools. By estimating the average size of the school and applying some average figure of fish density occurring within the schools, abundance estimations can be achieved. All of these techniques have their limitations and advantages in practical use. As the echo integration method offers the most general possibilities of application only this method will be thoroughly discussed in this note. Many of the questions raised may, however, be valid for the other methods as well.

The echo integration method is based on the assumption that the recorded echo intensity is proportional to the numbers of fish registered by an echo sounder when the transmission losses of the received signal are compensated for in the equipment. By integration of the squared voltage signal (echo intensity) the output can be considered proportional to the fish density along the course track.

This method has been in practical use for more than fifteen years and the above theoretically based assumption have by no means always been proved to be valid. However, in the practical application of the method a number of difficulties may be encountered particularly if the method is used with the intention of producing absolute estimations of fish abundance and not only e.g. relative indexes of fish biomass.

The first difficulty when starting to use this method is to achieve a sufficient stability in the performance of the echo sounder equipment. Good maintenance of such equipment has been found to be of essential importance and in practice it has been found necessary to check the performance and calibrate the equpment several times a year.

When an acoustic survey has been carried out its results can always be said to give a relative estimate of the fish abundance. By repeating such a survey from season to season or from year to year most valuable information about the development within fish stocks can be gathered. Considerably more complicated is the conversion of such estimates into estimates of true fish abundance. In theory a simple linear equation exists for such a conversion:

$$\bar{C} = c \cdot \bar{M}$$

where $\bar{C}$ is the average fish density, $\bar{M}$ is the average integrator output and c is the "conversion factor".

Before the total output of the integrator can be converted to absolute fish density, the contribution to $\bar{M}$ from a unit fish or fish density must be known. This contribution can be found at sea when the fish are scattered by dividing the output $\bar{M}$ with the numbers of fish which are counted on the echogram and taking into account the volume of the sound beam. An alternative method to achieve this is to measure the contribution from a unit density of fish within a cage submerged under the vessel.

The ability of a fish to reflect sound energy is usually expressed as its target strength and a lot of research has been done in this field. No simple general relationship exists between target strength and length or weight of fish and the relation between target strength and size of fish must be established empirically for

each species. It has also been shown that changes of tilt angle distribution of the fish registered may have considerable effect on mean value of target strength. This may lead to srious errors in abundance estimation if, for example, the tilt angle distributions are different for scattered and schooling fish and the abundance estimate of schooling fish is based on target strength measurements of scattered fish. Most important, however, is that the tilt angle distributions in an aggregation of fish have been shown in many cases to be affected by the presence of the surveying vessels. More information on tilt angle distribution within fish concentrations and its variation with survey conditions such as depth distribution of the fish, time of the day and biological factors such as fish age and maturity stage etc. should therefore be determined.

Another problem related to the behaviour of the fish during echo surveys is that fish close to the surface or close to the bottom are only recorded to a limited extent. This problem is of particular importance in temperate and tropical shallow waters where a typical behaviour pattern in many fish species is to aggregrate in shools close to the bottom during daytime and to rise to the surface at night. At least for surface fish, such problems may be partly avoided by using towed transducers and this technique has already been in practical use for some time. A general solution to this problem is to try to undertake investigations at times when fish may have the most favourable vertical distribution (is below the surface or off the bottom).

When fish are distributed near the surface the behaviour may as already mentioned, be considerably influenced by the movement of the vessel either through visual or auditory stimulations. Recent investigations have shown that both a local reduction in fish density beneath the vessel

and a considerable reduction in echo target strength frequently occur. The consequence of such an effect may be a considerable underestimation of the abundance of fish. So far, information on this probably important aspect is scanty and more data are needed.

A final problem related to the behaviour of the fish is the effect of high fish density when fish are aggregated in schools. At high fish densities the linear relation between fish density and the output from the integrator may break down and when schools are large, fish in the deeper part of a school may to some extent be shadowed by scattering and absorption of sound energy by fish which are nearer the transducer. If the linear relation is assumed to hold at the high densities a serious underestimation of stock size may occur. Research haa been directed towards determining the critical value for such fish density and it seems that when fish schools are of moderate size the acoustic survey results can be considered as being valid.

No method exists as yet for directly identifying fish acoustically. However, some species present signals on the echo sounder with different characteristics for example, different species may form schools of different shapes, densities, etc. and therefore give rise to distinctive types of echo traces. Usually however, when accoustic surveys are carried out, the echo recordings need to be continuously verified by fish sampling, most commonly by trawling. When many species and many size groups of fish are present the reliability of the acoustic abundance estimation will require representative fish sampling. As trawls are species and size selective even if small-meshed cod ends are used, the validity or otherwise of the sample is difficult to evaluate and can only be assessed by extensive experimental fishing.

For the same period of time the water volume sampled during an acoustic survey is usually many times larger than for any other type of survey. However, there might be a sampling error (variance) caused by the incomplete coverage of the area. There are theoretical problems connected with the variance estimation because of the systematic (non-random) sampling during such surveys. In addition, movment of the fish during the course of an echo survey may invalidate the assumption that the observations of fish density give a synoptic chart of fish distribution over the area covered. Perhaps that most frequently occurring bias in this respect is probably associated with the changes in vertical distribution in many fish species between day and night, and care should always be taken in order to clarify this if it is a problem.

All echo surveys are dependant upon fair weather conditions. Depending on the size of the research vessel and of its "seagoing qualities", the weather conditions may hamper the possibilities for obtaining good results. The main problem concerns bubble blocking of the acoustic signals, and this may lead to serious errors in the echo abundance estimates. This problem may be reduced by using towed transducers or at least partly overcome by the development of a functional mathematical model of sound energy absorption under varying weather conditions. At the moment, the preliminary results of this work seem promising.

Because of the problem mentioned above, it is of the greatest importance to take into consideration the patterns of distribution and behaviour of the fish and to carry out the survey when conditions for abundance estimation are as favourable as possible. The surveys should therefore ideally, be based on a thorough knowledge of the distribution and behaviour of fish, and pilot surveys

should be carried out when there are important gaps in this information. The best conditions for acoustic surveys occur when the species being studied is distributed within a defined area not too heavily mixed with other species and aggregated in scattering layers in mid-water. Such conditions may be linked to seasonal or diurnal changes in behaviour, and in the planning of surveys these factors ought to be considered most carefully.

Although acoustic abundance estimation methods have been applied for a number of years in many areas only to a limited extent has it been possible to make estimates of the precision and accuracy of their results. There clearly are several sources of variance and possible bias and some of the important ones have been mentioned above. By comparing the results from repeated surveys one may get an idea of the variance, which may be further improved if the results can be compared be alternative methods of abundance estimation.

Occasionally, it has been possible to make comparisons between the acoustic estimates and the results of tagging experiments and of eggs and larval investigations. These comparisons have led to the conclusion that acoustic survey results are by far the most reliable and that the precision of the estimate is satisfactory for normal purposes.

CONCLUSIONS

Acoustic surveys, in particularly echo integration surveys have proved, in spite of the number of difficulties to be most valuable for obtaining information of the abundance of fish stocks. The great advantage of such methods is of course the possibility to give a quick

and reliable estimate of the stock situation of pelagic and semipelagic fish species. Most other commonly applied methods of fish stock assessment, for instance the VPA, suffer from the classical problem that only after the fish are caught is sufficient information about the stock obtained, and this has often been seen to be too late in order to avoid serious overexploitation of important fish stocks.

From the experience obtained in the various areas where acoustic surveys have been undertaken, there is no doubt that considerable improvements in the method have already been achieved and this is most likely to continue. It should, however, be stated that experience has also shown that when such a method is introduced into new areas which perhaps are ecologically totally different from the areas where the method was developed, considerable attention should be given to the possibility of necessary adjustment.

Kjell Olsen
Tromsø, January 1983

Ref.No. TF/INT (NOR)-1/FI

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A G R E E M E N T

between

THE FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

and

THE NORWEGIAN AGENCY FOR INTERNATIONAL DEVELOPMENT

regarding the

CONSTRUCTION AND OPERATION OF A FISHERY SURVEY VESSEL

TF/LIT 41 (NOR)-1/FI

Agreement between the Food and Agriculture Organization of the United Nations and the Norwegian Agency for International Development regarding the construction and operation of a fishery survey vessel

ARTICLE I - CONSTRUCTION OF THE VESSEL

The Norwegian Agency for International Development hereinafter referred to as NORAD shall subject to appropriation of funds by the Parliament of the Kingdom of Norway undertake the construction of a fishery survey vessel as set out in the Final Report of the Working Group for the FAO/NORAD Fishery Survey Vessel dated 15 January 1971, the design and specifications, fishing gear and other equipment of which have been agreed to in consultation with the Food and Agriculture Organization of the United Nations hereinafter referred to as the Organization.

ARTICLE II - AVAILABILITY OF THE VESSEL TO THE ORGANIZATION

The vessel shall be placed at the disposal of the Organization and NORAD shall keep the Organization informed with respect to progress of design and construction of the vessel and shall give specific written notice at least 90 days in advance as to the date of the availability of the vessel.

ARTICLE III - OWNERSHIP

The vessel shall remain Norwegian property and shall be registered in Norway and be operated under the Norwegian flag by the Norwegian Institute of Marine Research, Bergen, hereinafter called the Institute. It is understood that detailed arrangements for the use of the vessel by individual charter agreements between the Organization and the Institute shall be set out in an agreement between those parties.

ARTICLE IV - OPERATING COSTS

(a) While it is recognised that funds available to the Organization for the use of the vessel are allocated from UNDP Special Fund or other sources for specific projects and therefore the Organization is not authorized to make a firm financial commitment with respect to the sharing of the operating costs of the vessel, NORAD has nonetheless taken note of the following:-

(i) that the Organization is confident that future projects and funds allocated for those projects will enable the Organization to enter into charter agreements for the use of the vessel in such projects;

(ii) that the availability of the vessel as well as the preferential charges for the use of the vessel, which will be set out in the aforementioned agreement between the Institute and the Organization, will enable the Organization to forego international tenders for obtaining such services whenever the vessel is required for projects executed by the Organization;

(iii) that the operating costs do not include any costs for amortization or depreciation, and insurance covering the vessel's hull, machinery and gear;

(iv) that in the light of (i), (ii) and (iii) above the Organization anticipates that it will make payment to the Institute of 40 per cent of the yearly operating costs of the vessel.

(b) It is expected that the vessel shall be transferred to the Institute and be available for operations in approximately January 1974. In accordance with the above a budget estimate for the operating costs of the vessel for the calendar year January-December 1974 shall be submitted by the Institute to NORAD and the Organization by 30 September 1972 and budget estimates for subsequent calendar years shall be submitted to NORAD and the Organization by 30 September of each year. The budget estimates will be subject to the approval of the Organization and of NORAD and, if necessary, consultations shall be held between the Organization, NORAD and the Institute to resolve any problems relating to the approval of the budget estimates.

(c) Starting in January 1974 NORAD shall transfer, subject to parliamentary appropriations, on 1 January and 1 June of each year, 50 per cent of 60 per cent of the yearly budget estimate of the operating costs for the calendar year to the Organization.

(d) The Organization shall immediately transfer the NORAD contribution to the account of the Institute in a bank account to be designated by the Institute. At the same time, and subject to the allocation and availability of funds and subject also to its agreement with the Institute as well as any individual charter agreements with the Institute for the use of the vessel, the Organization shall transfer up to an amount not to exceed 50 per cent of 40 per cent of the yearly budget estimate of the operating costs.

(e) The above payments by NORAD and the Organization shall be considered as payments on account and final settlement of the accounts for meeting the actual operating costs of the vessel will take place within four months following completion of each calendar year on the basis of the Institute's financial statements and records as audited by the Norwegian Government.

(f) Any over-payments made by NORAD or the Organization shall either be reimbursed or credited to the party concerned.

(g) All budget estimates and financial accounting shall be in Norwegian Kroner.

(h) Inasmuch as the NORAD contributions payable to the Organization in accordance with ARTICLE IV (c) above, as well as the payment of such NORAD contribution by the Organization to the Institute in accordance with ARTICLE IV (d) above shall be made in Norwegian Kroner, and since in accordance with the Organization's financial rules the above mentioned receipts and payments must be accounted for in the equivalent of US dollars, NORAD shall assume responsibility for any financial loss resulting from any change in the UN operational rate of exchange which might occur during the receipt of the NORAD contribution under ARTICLE IV (c) above and payment of such contribution to the Institute under ARTICLE IV (d) above.

ARTICLE V - DISPUTES

Any dispute between the two Parties arising out of this Agreement shall be settled by mutual agreement between the Organization and NORAD.

ARTICLE VI - DURATION OF THE AGREEMENT

(a) This Agreement shall come into force immediately upon signature of both Parties.

(b) This Agreement shall remain in force until either Party considers that the cooperation envisaged therein can no longer appropriately or effectively be carried out, at which time this Agreement may be terminated by mutual consent or either Party serving six months written notice on the other Party.

(c) Notwithstanding the provisions of ARTICLE V (b) the Agreement will remain in force until all obligations which have been undertaken in accordance with this Agreement while the Agreement was still in force shall be fulfilled by both Parties.

Any funds remaining to the credit of NORAD at the termination of this Agreement shall be returned to NORAD.

In witness whereof, the undersigned, being duly authorized thereto, have signed the present Agreement.

Done in duplicate in the English language at Oslo this twenty-seventh day of September one thousand nine hundred and seventy one.

For the Norwegian Agency for International Development.

R. K. ANDRESEN

Title DIRECTOR GENERAL

For the Food and Agriculture Organization of the United Nations

ROY K. JACKSON

ASSISTANT DIRECTOR-GENERAL (FISHERIES)

Contract between	Contrat entre	Contrato entre
THE FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS HEADQUARTERS OF WHICH IS SITUATED IN ROME, ITALY	L'ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE DONT LE SIEGE EST SITUE A ROME, ITALIE	LA ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACIO CON SEDE EN ROMA, ITALIA

and/et/y

NORWEGIAN INSTITUTE OF MARINE RESEARCH

established and existing under the laws of Norway

with its registered offices located at

Nordnespurken 2, Post Boks 2906,
5011 Bergen, Norway.

WHEREAS

The Food and Agriculture Organization of the United Nations, hereinafter referred to as the "Organization", has found it necessary to obtain with the minimum of delay the charter of a fishery survey vessel in order to implement its fishery field projects, and

The Norwegian Agency for International Development, hereinafter referred to as "NORAD" has recognised this need, and

The Parliament of the Kingdom of Norway has appropriated funds to NORAD for the construction of a fishery survey vessel as set out in the Final Report of the Working Group for the FAO/NORAD Fishery Survey Vessel dated 15 January 1971, the design and specifications, fishing gear and other equipment of which have been agreed to in consultation with the Organization, and

Such a fishery survey vessel, hereinafter referred to as the "vessel", is expected to be constructed and ready for operations and title transferred to the Norwegian Institute of Marine Research, hereinafter referred to as the "Institute", and

The Organization and NORAD have entered into an agreement on 27. September 1971 whereby the vessel is to be made available to the Organization and the operating costs of such a vessel will be met by contributions from NORAD as well as payments by the Organization in accordance with detailed terms and conditions to be agreed upon between the Institute and the Organization.

NOW THEREFORE

The Organization and the Institute have hereby agreed as follows:

ARTICLE I - Planning of the use of the vessel and the budgeting of operating costs

(a) The Organization will submit to the Institute a list of projects and charter periods for which it will require the vessel during the first year of operation, i.e. January/December 1974, not later than 1 August 1972. Similar information shall be submitted by the Organization to the Institute on 1 August of each year.

(b) On the basis of the information provided by the Organization in accordance with Article I (a) above, the Institute shall submit not later than 30 September of each year to the Organization and to NORAD budget estimates for the first year of operation and for subsequent calendar years. The calendar year budget estimates will be subject to the approval of the Organization and NORAD and the Institute shall participate in any discussions necessary to resolve any problems relating to the approval of the budget estimates.

ARTICLE II - Requests by the Organization for charter agreements

Requests for charter of the vessel shall be made in writing by the Organization to the Headquarters of the Institute and shall include the proposed charter agreement setting out inter alia charter terms and conditions already established by this contract. In addition the charter agreement shall establish the period of the charter as well as the area of operations and shall include such other necessary terms and conditions not covered by the present contract. Requests for charter of the vessel should normally be made not less than six months in advance.

ARTICLE III - Institute obligations

It is understood that the vessel shall remain Norwegian property and shall be registered in Norway and operate under the Norwegian flag and shall at all times conform to Norwegian laws and regulations governing the operation of such vessels. In addition the Institute shall be responsible for the following:

(a) Crew

The Institute shall be responsible for providing the following crew members assigned to the vessel, it being understood that this is a minimum crew required for positioning of the vessel and that supplementary crew as required for particular charter operations shall be provided by the Organization:

Captain (also Masterfisherman)
Mate (also Masterfisherman)
Second Mate (also Radio Operator)
Three Ship's Engineers plus Mechanic
Bosun
Three Deckhands
Cook
Steward
Instrument Chief
Technician (Instruments)

Total - 15 men

(b) Maintenance

The Institute shall be responsible for the undertaking of all repairs and maintenance of the vessel.

(c) Fuel oil and lubricants, other oils, ice and water

The Institute shall be responsible for providing all necessary fuel oil and lubricants, other oils, ice and water for the operation of the vessel.

(d) Organization's staff and/or counterpart crew and trainees

As required in accordance with the charter agreements effected under this contract the Institute shall provide accommodation and food for a maximum of four Scientists/Technologists, as well as nine counterpart crew or trainees.

ARTICLE IV - Organization's Obligations

(a) Charter fee

For the charter of the vessel in accordance with the responsibilities set out above, the Organization shall pay to the Institute an amount of NKr. 8,950 for each day of the charter period.

(c) Method of payment

Notwithstanding the provisions of Article IV (a) above, the maximum payment by the Organization to the Institute for charter of the vessel under any number of individual charter agreements shall not exceed 40 per cent of the operating costs of the vessel as defined in Article V (d) below during each one calendar year period

(c) Privileges and immunities

The Organization shall where appropriate in each charter agreement endeavour to include appropriate clause that privileges and immunities normally granted to subcontractors in the operation of Special Fund projects and other field projects executed by the Organization shall be provided to the Institute and the vessel personnel.

ARTICLE V - Financial Procedures

(a) The funds provided by NORAD for the operation of the vessel in accordance with the agreement signed by the Organization and NORAD on 27. September 1971 shall be immediately paid to the Institute in an account designated by the Institute. Subsequent payments of NORAD funds shall be made in the same manner every six months.

(b) Upon signature of this agreement and as soon thereafter as the Organization shall have concluded a charter or charter agreements with the Institute, and subject to receipt of the NORAD payments referred to in Article V (a) above, the Organization shall immediately advance payments for such charters to the Institute in an account designated by the Institute. It being understood that such advance payments shall not exceed 40 per cent of the six month pro rata of the yearly budget estimate for operating costs for that period as provided for in Article I (b) Similar payments shall be made every six months.

(c) The above payments by NORAD and the Organization shall be considered as payments on account and final settlement of the accounts for meeting the actual operating costs of the vessel will take place within four months following completion of each calendar year on the basis of the Institute's financial statements and records as audited by the Norwegian Government. Any over-payments made by NORAD or the Organization shall either be reimbursed or credited to the party concerned. All budget estimates and financial accounting shall be in Norwegian Kroner.

(d) Operating costs of the vessel shall generally consist of, but not necessarily be limited to, the following:

Insurances covering any injury to the crew, and third parties, including the Organization's staff and counterpart personnel.

Insurances covering any loss of, damage to or destruction of any property of third parties.

Salaries, bonuses, social security and other allowances and victualling of 15 man crew.

Fuel, lubricating oil, hydraulic oil, refrigerating ice and water.

Purchase and replacement of fishing gear, warps, expendable scientific equipment and supplies.

Replacement of instruments.

Maintenance (spares, docking, surveys, painting, repairs, inspection and other related costs).

Harbour charges (pilotage, agent's fees, wharfage, loading and unloading charges).

Victualling of FAO staff, counterparts and trainees aboard the vessel.

Management.

The operating costs shall not include any costs for amortization and/or depreciation and insurance covering the vessel's hull, machinery and gear.

ARTICLE VI - General Terms and Conditions

(a) Without prejudice to the authority vested in the Captain of the vessel, in accordance with conventions, laws and customs, the Captain shall be under the Organization's authorized officer's orders as regards all arrangements for the execution of the charter agreement. The Organization's authorized officer shall furnish the Captain directly with all sailing and operational instructions. The Captain shall keep appropriate logs which the Institute shall make available at all times to the Organization if so required.

(b) Any income from claims for salvage and assistance to other vessels shall be credited to the Institute.

(c) Any income from the sale of catches resulting from fishing operations carried out by the vessel during the performance of the charter agreements shall be credited to the Organization.

ARTICLE VII - Disputes

Any dispute between the parties arising out of this contract and/or the charter agreements shall be settled by mutual agreement between the contracting parties.

ARTICLE VIII - Duration of Contract

(a) This contract shall come into force immediately upon signature of both parties.

(b) This contract shall remain in force until either party considers that the cooperation envisaged therein can no longer appropriately or effectively be carri out, at which time this contract may be terminated by mutual consent or either party serving six months' written notice on the other party.

(c) This contract shall also be terminated in the event that the agreement between NORAD and the Organization is terminated.

(d) Notwithstanding the provisions of Article VIII (b) the contract will remain in force until all obligations arising from it are fulfilled by both parties.

ARTICLE IX - Notices

(a) Any notice affecting the rights or obligations of either party to this contract sh be given in writing and delivered in person or by telegram or by registered mail t the addresses given below:-

(i) To the Organization:

Food and Agriculture Organization of the United Nations
Via delle Terme di Caracalla
Rome, Italy.

(Attention - Director, Administrative Services Division)

(ii) To the Institute

At the Institute's address shown in the Preamble to this Contract.

(b) Notice shall be considered as effected as on the date of delivery to the addresses.

Signed on behalf of

THE FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

ROY I. JACKSON

Title: ASSISTANT DIRECTOR-GENERA (FISHERIES)

Date: 27 September 1971

Signed on behalf of

THE NORWEGIAN INSTITUTE OF MARINE
RESEARCH

G. SAETERSDAL

Title: DIRECTOR

Date: 27 September 1971.

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