THE ROYAL NORWEGIAN MINISTRY
OF DEVELOPMENT COOPERATION

Evaluation Report 4.89

FISHERIES RESEARCH VESSEL

«Dr. Fridtjof Nansen»

Januar 1989

CIC–MARINE

FISHERIES RESEARCH VESSEL

«Dr. Fridtjof Nansen»

Januar 1989

CIC-MARINE

The views expressed in this report are those of
the authors and should not be attributed to
the Royal Norwegian Ministry of Development Cooperation.

TABLE OF CONTENTS

1. Introduction

This report represents a review of available evaluation and information material on the "R/V Dr. Fridtjof Nansen"-programme, and a recommendation on the continuation of a revised programme through the building of a replacement vessel.

The consultants were commissioned by the Ministry of Development Cooperation, Norway to undertake this study, as per the Terms of Reference enclosed as Annex VI of this document. However, the present report and its findings and conclusions are those of the consultants, and cannot necessarily be construed as those of the Ministry of Development Cooperation.

Special emphasis has been put on the evaluation of the "R/V Dr. Fridtjof Nansen"-programme, in the context of the developing countries' needs, and Norwegian aid policies and priorities.

The report is based on material made available by the Ministry of Development Cooperation, Norway, interviews with a number of experts who, in one way or the other, have been involved with the programme or have made use of its results, and the consultants' own experience from work on development projects internationally.

A list of base material used for the evaluation and persons met is enclosed as Annex V.

The consulting assignment was undertaken by CIC-MARINE through a team of consultants consisting of: Sten Sverdrup-Jensen, team leader, Jørgen Møller Christensen and Torben Vindeløv.

2. Summary, Conclusions and Recommendations

2.1. Summary of Programme Review

The "R/V Dr. Fridtjof Nansen" was commissioned i 1975, and has since then undertaken resource surveys during 35 cruises in the Indian Ocean, the Atlantic, the Pacific Ocean and the Caribbean Sea.

The "R/V Dr. Fridtjof Nansen"-programme has been financed by Norway and UNDP, however, the UNDP contribution has been reduced from initially 40% (1975) to 0% (1987).

The vessel has been operating under the UN auspices. It has been at the disposal of FAO to "survey and appraise fish resources, and to assess their catchability". The vessel operation, including analysis and interpretation of survey data, has been the responsibility of IMR, whereas the responsibility for cruise planning, coordination, and for dissemination of survey results and their utilization has rested with FAO.

Over the years IMR has played an increasingly active role in the "R/V Dr. Fridtjof Nansen"-programme, performing most of the tasks which should have been undertaken by FAO.

Knowledge of the living marine resources (species composition, abundance, distribution, seasonality, etc.) is a prerequisite for a rational exploitation and protection. Without such knowledge, fisheries potentials will not be realized either to the individual fishermen, or to the countries concerned.

Developed countries have a long tradition for fishery research, aiming at rational resource but in the developing countries, the fishery research is generally in an infant state, even though extensive exploitation of the marine resources often takes place.

Information on fish resources can in principle be obtained by two different methods, each with some inherent advantages and disadvantages. The one method is based on analysis of long term data series derived mainly from fish catches, and requires well functioning national research institutions. The other method, which is exclusively based on the collection of data by research vessels, can function without connection to national research institutes.

The "R/V Dr. Fridtjof Nansen"-programme is based on this latter method. The "R/V Dr. Fridtjof Nansen" undertakes acoustic and trawl surveys. The major limitations of the "R/V Dr. Fridtjof Nansen" surveys have been the inability to survey resources on shallow depths and the limited time allocated to surveys of a given area. In spite of these limitations, the programme has some very important advantages, some of which are the contribution to the long term build up of knowledge of the world's marine resources, and the establishment of a scientific foundation for a rational exploitation of marine resources by developing countries.

Generally, there is an unsatisfied demand for research vessels, even though there exist more than 1.000 fisheries training and research ships, all of which are more or less underutilized. In an attempt to improve on the utilization of these research vessels, UNDP/FAO have initiated a registration of the vessels in a data bank.

It is a captivating thought that existing research vessels, properly utilized, could replace the "R/V Dr. Fridtjof Nansen"-programme. This is, however, not the case.

The "R/V Dr. Fridtjof Nansen"-programme satisfies some basic needs that the use of vessels from the register does not satisfy, namely the need for neutrality (as the vessel works under UN auspices), and for uniformity in data collection and presentation. Further, there is a need for a focal point for motivation and training, and for the accumulation of knowledge in one location easily accessible to all.

The effectiveness, in a development context, of the "R/V Dr. Fridtjof Nansen"-programme has been questioned, and in 1982 the programme was evaluated to measure the impact on fisheries sector development plans and fisheries management plans in developing countries.

The evaluation study concluded, among others, that the impact could be strengthened significantly through extensive follow up on the cruise results. The survey results were of a high scientific standard, but difficult for the recipient countries to assimilate and use, and too little effort was made to assess the catchability of resources surveyed. The best impact was achieved in countries where the "R/V Dr. Fridtjof Nansen made recurrent and intensive surveys, i.e. Mozambique, or in countries where the surveys could verify or adjust assumptions already made regarding off-shore resources.

Since the 1982 evaluation, positive action has been taken by IMR to improve on follow-up work. Seminars are now an integral part of the survey programme. Even if no exact documentation has been collected, as part of this study, indications are that the impact has greatly improved as a result of the more systematic follow-up.

Development agencies have made extensive use of the "R/V Dr. Fridtjof Nansen" survey data in their project identification and appraisal work. Therefore, there has been a direct impact on fisheries development through the establishment of donor funded projects.

With the end of the "R/V Dr. Fridtjof Nansen's" useful life in sight, FAO undertook in 1987 an assessment of the future need for deployment of fisheries research vessels in developing countries. The study concluded that the programme should be continued through the building of a slightly larger vessel. In the continued programme, FAO's planning, execution and coordination capacity should be strengthened. Inshore survey work should receive more attention through research in inshore survey technology and methodology, and through parallel surveys undertaken by other vessels.

The consultants are in agreement with most of the conclusions of the 1987 assessment, but not with some of the recommendations. It is felt that the success of the renewed "R/V Dr. Fridtjof Nansen"-programme should be measured by the extent to which the data are used by the industry and governments for fisheries development and for the protection of the environment and resources.

A new "R/V Dr. Fridtjof Nansen"-programme should put higher emphasis on documentation of catchability, and the survey vessel should, consequently, be equipped for extensive commercial scale experimental fishing.

The trend, whereby the planning and follow-up work are increasingly being undertaken in Bergen by IMR, should be supported by the establishment of a programme headquarters at IMR FAO should limit its role to that of a liaison office between the programme headquarters and the developing countries.

Future surveys should ideally be coordinated with other concurrent and supplementary projects, in order to achieve maximum impact. During the course of this study, informal contacts were made to the other Nordic development agencies, and they all supported the concept of a coordinated assistance to fisheries development planning and resource management, incorporating the "R/V Dr. Fridtjof Nansen"-programme.

The "R/V Dr. Fridtjof Nansen"-programme is, in general terms, compatible with the overall Norwegian Aid Policies and Priorities. Since the "R/V Dr. Fridtjof Nansen"-programme aims at the development of developing countries' fisheries sector, the programme falls within one of the sectors where Norway has outstanding technical competence. Even if indirectly, the programme is oriented towards the fulfilment of the developing countries' basic needs, it is directly aiming at assisting the developing countries in protecting their renewable resources - a high ranking Norwegian aid priority.

The only flaw of the programme, in a development context, has so far been the inability to directly benefit the poorer segments of the population, i.e. the artisanal fishermen operating in the inshore waters.

2.2. Conclusions and Recommendations

The consultants have found that enough information is available upon which to base a decision on the possible continuation of the "R/V Dr. Fridtjof Nansen"-programme.

The consultants in general agree with the recommendations of the 1987 report. However, they disagree with the recommendations regarding the strengthening of FAO, and the type of surveys to be performed.

On the basis of the review of available material concerning the work of "R/V Dr. Fridtjof Nansen", interviews with relevant persons, combined with the consultants own experience, the following supplementary recommendations are put forward, which replace or expand the 1987 report recommendations, where relevant.

a. The "R/V Dr. Fridtjof Nansen"-programme should be continued by the construction of a new fisheries research vessel.

- It is possible to redirect the "R/V Dr. Fridtjof Nansen"-programme so that it is in full compliance with the policies and priorities for Norwegian development aid.

- The "R/V Dr. Fridtjof Nansen"-programme will continue to have substantial positive effects on planning and investments in the fisheries sector in the developing countries.

- Continued efforts are required to build up fisheries management capabilities in developing countries, and the "R/V Dr. Fridtjof Nansen"-programme is a most valuable contribution hereto.

- The programme contributes to the ever increasing accumulation of knowledge about the world's fish resources and the marine environment and, as such, provides information necessary for the protection of the environment.

- Recent improvements in cruise planning, follow-up activities and in the communication of survey results encourage much needed fisheries research and management activities in the developing countries.

- Irrespective of how surveys will be carried out, by local research vessels or through vessel charter, there will be a continued need for a modern, well equipped and top calibrated internationally working vessel as a reference for survey work.

b. The "R/V Dr. Fridtjof Nansen"-programme should continue under the auspices of UN as:

- It is essential that the vessel can operate worldwide as a neutral vessel.

- The continued use of the FAO/UNDP representations, contacts and expertise is a prerequisite for involvement of local authorities, and for integration of survey activities in other ongoing or planned fisheries development activities.

c. The planning and operational headquarter for the "R/V Dr. Fridtjof Nansen"-programme should be established with the Institute of Marine Research in Bergen, in collaboration with the fishing gear section of the Institute for Fisheries Technology Research, Bergen, and that FAO be used as a liaison office on the following grounds:

- It is appropriate to have the planning and operational head quarters at the same location, as it will induce a better integration of planning, logistics and follow-up activities.

- One programme headquarters means that the responsibility for the dissemination of survey results and follow up activities is placed in one office, and that a direct link is established between the researchers and the users of survey results.

- IMR has, over the years, successfully assumed increasing responsibility for cruise planning and follow-up activities.

- The uncertainty of the future capacity of FAO makes it desirable to place the project headquarters in a more progressive environment.

d. The "R/V Dr. Fridtjof Nansen"-programme should be evaluated on a regular basis, especially as concerns the impact of the programme inclusive of follow-up activities. The recurrent evaluations should be done on the basis of a logical framework, to be established prior to the commencement of a survey programme. An initial evaluation should form basis for the design of the new "R/V Dr. Fridtjof Nansen"-programme's follow-up activities.

e. The new "R/V Dr. Fridtjof Nansen" should be slightly longer than the existing "R/V Dr. Fridtjof Nansen", and that it be equipped for experimental commercial fishing, as well as for acoustics and traditional survey methods, on the following grounds:

- Higher emphasis should be put on documentation of fish stock catchability and appropriate catch technologies, in addition to stock assessments and species identifications.

- The vessel should be able to cruise for several months, and the space requirements for supplies, fishing gear, research facilities, crew etc. are such that a vessel of 50 m length or more is desirable.

- The vessel should be able to cross the oceans in all weather conditions, and must be more stable in high seas than the existing "R/V Dr. Fridtjof Nansen".

f. The effects of the "R/V Dr. Fridtjof Nansen"-programme should be enhanced through coordination with other Nordic fisheries development projects as:

- Experience shows that the results of the "R/V Dr. Fridtjof Nansen" surveys are better utilized, if they are an integral part of a wider project or programme package.

- The Nordic countries already implement and/or finance complementary projects.

- The fisheries development policies of the Nordic countries have similar objectives.

g. Sufficient professional staff should be employed to secure that the work at the Marine Research Institute, and at the Institute for Fisheries Technology Research, and on-board the research vessel be carried out in the most efficient way - including staff for planning, communication, cooperation, training, operation and research.

3. Brief Presentation of the Ongoing NORAD/FAO "R/V Dr. Fridtjof Nansen"-Programme

3.1. Programme Objectives

In September 1971, an agreement was signed between the Norwegian Agency for International Development (NORAD) and the Food and Agricultural Organization of the United Nations (FAO), providing for the construction of a fisheries research vessel. The vessel should carry out a jointly funded program of scientific and exploratory investigations of the fisheries resources of developing countries.

The main tasks of the "R/V Dr. Fridtjof Nansen", as stated in the "Final Report of the Working Group of the FAO/NORAD Fisheries Survey Vessel" (January 1971), were survey and appraisal of fish resources (abundance, distribution, seasonality) and assessment of their catchability and, as a secondary task, training.

The construction costs of the vessel, which was delivered in October 1974, were met by NORAD, which is the owner of the vessel.

The responsibility for the operation of the vessel was given to the Norwegian Institute of Marine Research (IMR), which would receive 60 per cent of the operating costs from NORAD and the remaining 40 per cent from FAO (provided the organization was able to raise the necessary funds !)

The responsibilities, as regards the execution of the "R/V Dr. Fridtjof Nansen"-programme, were specified in a contract between the parties dated September 1971.

FAO's responsibilities comprised the planning and coordination of cruises and the obtention of permissions for the vessels to operate in territorial waters.

The responsibility of IMR comprised the staffing and running of the vessel, the undertaking of the survey and experimental fishing activities, the on-board training and accommodation of trainees, and the handling of harbour formalities, etc.

3.2. Fisheries Surveys Undertaken

In January 1975, the "R/V Dr. Fridtjof Nansen" was made available for FAO and in February 1975, it started its first survey operations in the Arabian Sea, as an integrated activity in FAO's Indian Ocean Fisheries Development Programme.

From 1975 until today, the vessel has been undertaking resource surveys in the Indian Ocean, the Atlantic, the Pacific Ocean and the Caribbean Sea, as specified below:.

Fisheries Resources Surveys Undertaken by "R/V Dr. Fridtjof Nansen" - 1975 - 1988

PERIOD	ASSIGNMENT	PERIOD	ASSIGNMENT
Feb 1975 Nov 1976	NW Arabian Sea	Jan-Jun 1977	Pakistan
Aug 1977 June 1978	Mozambique	Jul 1978	Seychelles
Aug-Sep 1978 Apr-Jun 1979	Sri Lanka	Jul-Aug 1979	Oman & Aden Gulfs
Sep-Nov 1979	Burma	Nov-Dec 1979	Bangladesh
Jan-Feb 1980	Sri Lanka	Mar-Apr 1980	Burma
May 1980	Bangladesh	Jun-Aug 1980	Malaysia/Thailand/ Indonesia
Sep-Nov 1980	Mozambique	Dec 1980	Kenya
Jan-Feb 1981	Oman & Aden Gulfs	Mar 1981	Egypt/Tunis
Apr 1981	Algiers	Apr-Dec 1981	West-Africa
Dec 1981 Apr 1982	West Africa	Jun 1982	Tanzania
Aug 1982	Kenya	Sep-Oct 1982	Mozambique
Nov-Dec 1982	Tanzania	Feb-Mar 1983	Oman Gulf/Pakistan
May-Jun 1983	Kenya/Tanzania/ Mozambique/Madagascar	Aug-Sep 1983	Maldives/Pakistan/Iran
Nov-Dec 1983	Gulf of Oman/ Oman EEZ	Jan-Mar 1984	Pakistan/S. Yemen/ Somalia/Ethiopia
Apr-Jun 1984	Oman/Iran/Pakistan	Aug-Sep 1984	S.Yemen/Somalia/Oman
Mar-Dec 1985	Congo/Gabon	Jan-1985 Jun 1986	Angola
Aug-Dec 1986	West Africa	Feb-Dec 1987	Central America/Pacific Ocean
Feb 1988	Caribbean Sea/Western Central Atlantic		

During "R/V Dr. Fridtjof Nansen" 12 1/2 year of operation, the vessel has undertaken resource surveys and related activities for 200 - 240 days per year, which makes it one of the world's most active fisheries research vessels.

3.3. Funding of Vessel Operations

It was stated in the agreements between NORAD, FAO and IMR on the construction and operation of "R/V Dr. Fridtjof Nansen", that the vessel should be placed at the disposal of FAO "to implement its fishery field projects".

The main source of funds for FAO's financial participation in the programme has been UNDP. However, during the 1980'ies, UNDP has, for financial and other reasons, cut down on the allocation for this programme. Since 1984, FAO has, therefore, only contributed with 20 per cent of the vessel operation costs, and from January 1987, NORAD has been the only funding agency for the "R/V Dr. Fridtjof Nansen"-programme until the termination of the programme in 1989 when the vessel is expected to be worn out.

3.4. Follow up Activities and Dissemination of Survey Results

The programme agreements between NORAD and FAO, and FAO and IMR respectively, do not state how the survey results are to be presented, and how the findings are to be transferred to the primary beneficiaries of the programme (the developing countries), to serve as basis for fisheries development and management planning.

As the vessel was placed at the disposal of FAO "to implement its fishery projects", it is obvious that the dissemination of the survey results and their utilization were the responsibility of FAO. However, this issue has turned out to be the subject of much criticism and discussion, all along the implementation of the "R/V Dr. Fridtjof Nansen"-programme.

In 1982, NORAD undertook an evaluation of the programme, where particular focus was placed on "the quality and relevance" of the survey reports, the forms of presentation applied in the reports, and the actual and planned use of the reports in the elaboration of fisheries plans or for management purposes.

The evaluation report (ref. Annex I) concluded that the survey reports are of high scientific standard but very technical in their contents and presentation of findings.

The frequent inability of fisheries administrators and planners to understand and interpret the survey results has, therefore, to a large extent, impeded the practical application of the information provided in the formulation of sector development plans and management schemes.

The evaluation also revealed that the task of assessing the catchability of fish stocks detected has, for various reasons, been scantily undertaken; and that the lack of information on this aspect had restricted the value of the reports, as basis for the planning of the resource exploitation in the developing countries.

Consequently, the evaluation team pointed out the need for experimental fishing, and strongly recommended that survey reports be supplemented with commentary reports, where the implications of the survey findings for planning and commercial purposes were explained. The evaluation also recommended that follow-up activities, e.g. in the form of seminars and conferences be arranged, where the survey results could be presented, and their implications discussed among all interested parties, i.e. scientists, administrators, politicians, and industry representatives.

Following the criticism and recommendations of the evaluation report, action was taken by IMR and NORAD to improve on reporting and follow-up activities. IMR now submits cruise reports in both English and the official language of the country concerned, and the final survey reports now include comments on the resource management implications of the survey results. National or regional seminars are now a regular feature at the end of each survey programme.

Such follow-up seminars of 3 to 4 days' duration, were arranged in Kenya, Tanzania and Mozambique in 1984, in West Africa in 1986 (with the CECAF set-up), in Angola in 1987 and in Costa Rica in 1988.

All seminars have been attended by fisheries scientists, fisheries administrators, politicians and fishing industry representatives. The agenda has comprised presentation and discussions on central aspects of national or regional fisheries development and management, in addition to the presentation of the "R/V Dr. Fridtjof Nansen" survey results.

3.5. Organization of Programme Execution

In spite of its programme obligations, FAO has, far from always, been able to undertake the planning and implementation of the "R/V Dr. Fridtjof Nansen" survey programmes. Whereas some of the earlier surveys carried out, e.g. the surveys in the Arabian Sea, the Bay of Bengal, and the South China Sea, were closely linked to FAO regional fisheries development projects, the trend in recent years has been that the planning responsibilities of FAO have, increasingly, been taken over by IMR, and that FAO has fallen back into a more supportive role.

In the course of this development, the IMR's "NORAD-office" has developed into a small but very efficient administrative unit, capable of handling survey planning, vessel operations as well as follow-up activities.

4. Global Needs for Fisheries Resources Surveys/Fish Stock Assessments in the EEZ's of Developing Countries

4.1. General

There is a global need for information about the living resources of the sea. Countries having an EEZ and, thus, fishing potentials must know the size of their fish resources, their composition, distribution and other characteristics, in order to be able to manage the resources.

Careful management of the marine resources is the most essential basis for their rational exploitation and, hence, for the development of the fishing sector, its fishing communities, fish production, export, etc.

Many developing countries do not have sufficient knowledge about their fish resources, and need assistance to acquire it.

4.2. Benefits From Resource Management

It is in the interest of the developing countries to have an orderly managed fishery for two main reasons:

a. Resource and Environmental Protection.

All open access and non-regulated fisheries will, if initially financially attractive, inevitably lead to an over-exploitation of the resource. The fisherman will continue to fish for as long as his marginal income is higher than his marginal cost. Such rate of fish exploitation is beyond the Maximum Sustainable Yield and will, not only result in a depletion of stocks, but also impoverish the fishermen as they will not be able to set money aside for depreciation of boats and gear.

b. Optimum Resource Utilization.

The rate at which an open access fishery will exploit the financially attractive stocks will escalate to an equilibrium beyond, not only the Maximum Sustainable Yield, but also beyond the Economic Optimum Yield. From a macro-economic point of view, fishing beyond the Economic Optimum Yield represents a waste of national resources since profits are falling.

In an open access fishery there is a fundamental conflict between the individual fishing units, which fish for short term profits and the national economy, which wishes to prevent depletion of stocks and optimize the macro-economic long term benefits of the renewable fish resources.

This argument can by analogue deductions be extended to regions and even the entire globe, especially now, with the expansion of the EEZ's and the developing countries granting fishing rights to foreign vessels. The developing countries have, by the extension of their EEZ's, taken upon themselves an added responsibility for the exploitation of the world's marine resources, and the environmental impact thereof.

Even if a developing country decides to let foreign fleets harvest the resources of its EEZ, it is important that the country to know the value of its resources in order to negotiate a license fee. At a later state, when the country wants to take over the fishery in its own EEZ, it is equally important to know the size of the resources and their catchability, so that its fishing fleet may be adjusted to the demands.

4.3. Fisheries Research in Developed Countries

In the developed countries, e.g. the North Atlantic region, a number of highly developed fishery research institutes, a fleet of fishery research vessels, and hundreds of scientists work in a well-organized international cooperation, with the main objective of providing knowledge of the size, composition and dynamics of the marine resources and their exploitation. This work is regarded fundamental to the fisheries management, which is carried out by governments and international commissions, such as the Baltic Fisheries Commission or the EEC Commission.

Most fisheries research institutes in developed countries have spent more than half a century to reach their present level of expertise, and they have been able to grow parallel to the development of the fishery.

International scientific organizations like the International Council for Exploration of the Sea has played a major role in the coordination of this development.

4.4. Fisheries Research in Developing Countries

In developing countries, the establishment of the EEZ's have, in many places, led to a very fast increase in the exploitation of the resources with no, or very little, knowledge available about the long term consequences to the fish stocks and, hence, to the fishing industry, its economy, the employment situation, the social structure of the fishing communities, etc.

The information needed to improve their situation, by introduction of proper management of resources and fisheries, requires research and monitoring. Fisheries research activities require trained scientists, organization of the work, laboratories, research vessels, etc. The major part of the developing countries do not meet these demands. They need assistance in order to be able to manage their marine resources.

Training of scientists in fish resource evaluation, build-up of well-functioning scientific institutions, and establishment of systems for transfer of advice from scientists to administrators are carried out by the FAO/DANIDA Project on Training in Fish Stock Assessment in the Tropics and Fishery Research Management (1982-92) (See Appendix VIII). This is a long term programme, which may gradually enable the national research institutes to provide the necessary data on resources and fisheries for their administration. Other bilateral and multilateral programmes contain similar projects, but at a minor scale, e.g. the Bay of Bengal Project (SIDA-DANIDA), NORAD activities in Mozambique, etc.

In other projects, the aid has been concentrated on provision of research vessels, laboratory buildings and other facilities. Research vessels with sophisticated equipment have, for example, been donated to developing countries, in a number of cases with very little success. Only in exceptional cases, where an extensive long term follow-up training and a maintenance programme have been connected to the donation, has the project been successful.

The present situation is:

There is a major need for development of fisheries research and fisheries management in developing countries, to enable the countries themselves to measure, monitor and manage their own resources. Funds are currently made available for assistance in this field. However, it may, and most likely will, take one or two decades before this development is satisfactorily completed.

Within this period there is a high risk that a) the resources become even more over-exploited than they are at present, b) the developing countries do not succeed in managing their resources and fisheries, and c) potentials for the fishing communities, and the fishing industry are irretrievably lost.

Therefore, there is an urgent need for information and monitoring of the size, composition and distribution of the resources and of their catchability, to be used for current management measures.

"R/V Dr. Fridtjof Nansen" has throughout the last 12 1/2 years provided such resource evaluations to a number of developing countries which, otherwise, would not have had access to this information.

There is a need for a continuation of this activity. Norway is the one country in the world, which has the experience and the expertise to do this right away - by a continuation of "R/V Dr. Fridtjof Nansen"-programme.

5. Appropriate Methods for Detecting, Assessing and Monitoring Marine Fisheries Resources and the Role of Research Vessels

5.1. Assessments of Fish Stocks

Assessment and monitoring of fish resources must be based on knowledge about the biology of the fish, their life cycles, distribution, migration, and their environment.

In principle, there are two ways in which fish resources may be assessed: a) one, where the assessment is based upon long term series of data on the length and age composition of the stocks, and b) based on short term data collection by a research vessel.

a. Long term data series.

Long term series of data on length, weight and age composition, combined with information on fishing effort and catches, incorporated in mathematical models, provide information used for the estimation of present and future stock sizes and yields.

This is the traditional way of assessing stocks and fisheries in the EEZ's of the developed countries. It requires systems for regular data collection in fishing harbours, research vessel surveys comparable over series of years, data processing systems, basic biological research, and development of population dynamic models.

The main data base for this type of fish stock assessment is the age composition of stocks and catches over a series of years.

Since it is very difficult and, in most cases, impossible to determine the age of tropical fish, this assessment technique is almost exclusively used in the temperate and arctic waters of the developed countries.

However, new methods have been developed which, in principle, allow for the same assessment techniques to be used on the basis of length composition data.Consequently, they can be used for tropical fish as well.

These methods are being taught at the FAO/DANIDA training courses in fish stock assessment, and may form an important tool in the long term approach to the development of fisheries research in developing countries.

Research vessels are used for collection of data on basic biological and ecological information, needed for the assessment methods mentioned above.

b. Research vessel surveys/assessments.

The second way, in which fish stock assessment may be carried out, is almost exclusively based on data collected by research vessels, within a limited period of time, in trawl surveys for demersal fish, and acoustic surveys for pelagic fish.

In the trawl surveys catch by area fished (swept area) form the key information, and in acoustic surveys the echoes of sound emitted from the vessel and reflected by the fish under it, are the basis for estimation of stock size, distribution, and composition of the resource. Supplementary information to the acoustic measurements is obtained by mid-waters trawling.

A research vessel may also be used for experimental fishing on a semi-commercial scale, to obtain information about the catchability, density and distribution of the resource in a certain area.

The assessment, based on long term series of data, requires well-functioning national research institutes.

The research vessel's trawl and acoustic surveys (the "R/V Dr. Fridtjof Nansen approach) can be operated without connection to national research institutes but may, on the other hand, create a valuable basis for their development.

5.2. The Work of "R/V Dr. Fridtjof Nansen" and its Limitations

"R/V Dr. Fridtjof Nansen" can operate in the EEZ's of all developing countries, all over the world. With an operating range of approximately six months, it is independent of a land base in the areas where it operates. It may operate as close to the coast as its deep-draught and the local conditions permit.

The types of work carried out from the vessel may be grouped into acoustic surveys, trawl surveys and hydrographic surveys. All three categories of work will often be carried out during one survey but weighted differently, according to conditions and objectives for the locality which is being surveyed.

a. Acoustic Surveys

The main aim of an acoustic survey is to determine the biomass of fish within the part of the sea which is being surveyed, as well as their composition and distribution.

The technology and methodology for hydro-acoustic estimation of fish biomass have, to a large extent, been developed in Norway, which is a pioneering country in this field. Some twenty years ago, only a very few European research vessels were equipped to do this kind of work, which not only requires a very special construction and equipment, but also a staff of specially trained scientists and engineers. Today, acoustic surveys are carried out by research vessels from most European and North American countries, and this technique plays a still more important role in the monitoring of fish stocks in the North Atlantic and North Pacific. The development of the instrumentation and the scientific methods indicate that even more extensive, detailed and precise information may, in the future, be obtained by the use of the hydro-acoustic technique. Portable systems, which may easily be installed and worked from minor boats, are especially interesting for shallow water acoustic surveys.

Mid-water trawling is part of an acoustic survey. Samples of the fish, which are being counted, are caught in order to determine species and size compositions.

Acoustic surveys only cover pelagic fish (swimming in the water mass above the bottom) or demersal fish in a pelagic stage of life.

b. **Trawl Surveys**

Assessment of biomass and species/size composition of the demersal fish (on the bottom), is done by trawl surveys.

This technique is used all over the world for biomass estimates of demersal species. It does not require advanced technology like acoustic surveys. However, it requires much experience, especially when it has to be carried out in different areas with changing conditions. The many years of experience in trawl surveys within the EEZ's of a number of developing countries, which is available at the Fisheries Research Institute in Bergen, is an invaluable "data bank".

The trawl catches, which are made by both mid-water and demersal trawlings, provide a huge material of fish which, primarily, gives the information needed for the surveys. It also gives information and material to be used for taxonomic descriptions of the fish species in the area, and it provides data, which are very important as a basis for alternative stock assessment techniques (like those taught at the training courses, arranged by the FAO/DANIDA project on Fish Stock Assessment in the Tropics, which are based on data on length composition of catches of fish). "R/V Dr. Fridtjof Nansen" provides such data, which may form a valuable source for the local research institute, and a basis for follow-up on the work of "R/V Dr. Fridtjof Nansen".

c. Hydrographic Surveys.

Collection of hydrographic data on the physical and chemical processes and components of the water, i.e. measurements of temperature, salinity, oxygen etc., is carried out, when relevant to the purpose of the survey, e.g. distinguishing water masses on the basis of temperature or salinity. Research vessels also collect basic hydrographic data for general descriptions of the hydrographic conditions in the area, or as a routine for submissions to the international data centres, which provide the "weather charts" of the sea.

d. **Limitations and improvements.**

The time allotted for surveying an area is one of the constraints on the "R/V Dr. Fridtjof Nansen" activities. The ideal approach would be several research vessels, working all year round and several years in one limited area, to cover all seasons, and all stocks and fluctuations from year to year, as done in North Atlantic waters.

"R/V Dr. Fridtjof Nansen" is alone in covering a large part of the seas of the world. Nevertheless, it provides the countries, which it assists, with very important, although incomplete, basic information on their resources, allowing them to make decisions on investments and management.

Even if it is difficult to measure, this basic information may be as useful to the country and perhaps carry as much weight as the supplementary information, which might be achieved by a sophisticated monitoring system like that of the North Sea.

The resources living in the near shore sea, from 0 to approximately. 10 meter depth, cannot be assessed by acoustic or trawl surveys carried out by a large research vessel.

Also tuna stocks, which migrate over long distances, and species migrating into rivers and estuaries, are excluded from the assessments made by "R/V Dr. Fridtjof Nansen".

These shortcomings are regrettable but, taking into consideration the complexity of the marine ecological system and the extent of the EEZ's, the "R/V Dr. Fridtjof Nansen" coverage is impressive, and contributes significantly to the total picture of the magnitude of the fish resources in the areas where it operates - and to the global picture as well. Future work, using new techniques for in shore waters, may improve the coverage even more.

The communication of results to the recipient countries has, in the recent years, been supplemented by holding seminars. Reports on surveys,. resources and seminars are issued. Data are now being made available to the individual countries in a Personal Computer usable form. Scientists from developing countries are offered fellowships for education in Norway.

The most recent project, connected to "R/V Dr. Fridtjof Nansen" activities, is a 3 years follow-up project in Central America financed by NORAD. Its aim is to transfer the results of the "R/V Dr. Fridtjof Nansen" survey to the Central American countries, and assist them in training their scientists to continue the work, and to develop the infrastructure of both fishery research and fishery management.

These activities describe a gradual improvement of the communication of results and follow-up elements of the "R/V Dr. Fridtjof Nansen"-programme.

5.3. The Need for a Continuation of the "R/V Dr.Fridtjof Nansen"-Programme

If developing countries wish to achieve a better management of the available natural fish resources, this can only be done on the basis of research and resource assessments. The marine resources are different from land-based resources, such as agriculture and forestry, they move over boundaries which cannot be seen, they are part of complex ecosystems, the elements, processes and function of which are not very well known. Their management requires sea-going research, which can cross boundaries and has the technology and methodology to obtain the knowledge required for management.

Assistance in this field may be concentrated on one or a few countries or regions, and may aim at setting up a proper research organization to work in the EEZ's of these countries, and provide the data needed for management. Work like this is carried out by NORAD, DANIDA, SIDA, FAO and other organizations, as separate projects or as part of large projects.

Assistance is also offered by the "R/V Dr. Fridtjof Nansen"-project, to provide the information needed by many developing countries for proper management of their fish resources, by means of a technique which they do not themselves possess. At the same time, this means monitoring some of the world's important resources and environment, which would not otherwise be monitored.

By a continuation of the "R/V Dr. Fridtjof Nansen"-programme, the following benefits may be achieved:

- The resource evaluation and monitoring, as a basis for management, may be continued in areas where this is not otherwise possible.

- The scope of the programme may be extended to cover also important global environment monitoring.

- The immense experience in this field, developed during the preceding 12 1/2 years, and the advice of the project evaluations, may ensure improved planning and organization of the work, and better communication of the results.

- The continued work of "R/V Dr. Fridtjof Nansen" may provide an important element in the build-up of national fisheries research activities in the developing countries.

- Complementary activities, carried out by the other nordic countries, may increase the value of the project even further.

- The direct beneficiaries will be a) the people working in the fishing sector of the developing countries, from the artisanal fishermen to the owners of the export firms, b) the countries as such, due to long term improvement in the exploitation of fish resources, and c) the world community, due to better information about changes in marine resources and environment in parts of the world, which are otherwise not covered.

6. The Global Supply of Fisheries Research Vessels and the Possibility/Appropriateness of Chartering Research Vessels

6.1. The FAO/IOC "Cooperative Use of Vessels for Research, Development and Training"-Programme

Even though more than 1,000 fisheries training and research ships exist in the world, there is still an unsatisfied demand for vessels for fisheries research.

This could, at first glance, appear a contradiction, however, the geographical distribution of research and training vessels does not match with the pattern of demand and, in addition, many of the countries, which possess such vessels do not make appropriate use of them for reasons, such as lack of funding for operation and maintenance, or low domestic demand for surveys and training.

UNDP/FAO have, since 1964, made research and training vessels available to developing countries out of the "UNDP/FAO Fisheries Vessel Pool", but today there is hardly any usable vessels left in the pool, and this service is, therefore, now virtually non-existent.

Realizing the continued demand for research and training vessels, FAO is establishing a new project "Co-operative Use of Vessels for Fisheries Research, Development and Training", which is funded by UNDP.

The project was formulated in a feasibility study, undertaken by FAO in 1983, in which it was determined that owners would be willing to make their under-utilized vessels available to countries, institutions and projects lacking such ships.

FAO would, under the project, act as an honest broker between vessel owners and potential vessel users. For this purpose, FAO is establishing, and will maintain, a register of vessels, their particulars, and availability. In addition, FAO will offer technical assistance and consulting services to owners and users, as required, and pursue donor support for survey projects and programmes.

The register was implemented in August, 1988. As of 10th November 1988, it held data on 87 vessels. FAO estimates that by April 1989, 400 vessels will be registered.

The success of the project will hinge on three major issues:

a. **Funding.**

In general, it cannot be expected that the lease of research vessels is paid out in local funds in the developing countries, and the funding of the research and training activities will have to come from bilateral and/or multilateral sources. Therefore, the success depends on the extent of which leased research and training vessels will become a component of internationally financed fishery development projects.

b. **Acceptability.**

The lease concept has been challenged by a number of the experts interviewed, as it is questionable whether vessels flying a foreign and not neutral flag, and perhaps with foreign crew members, will be allowed to operate as freely in territorial waters of the developing countries as would a vessel flying a neutral UN flag. This could especially be a source of problems if the vessel is chartered for regional surveys of migrating stocks, where the vessel would have to cross EEZ borders.

c. **Management.**

It must be ensured that the vessels registered are kept in an appropriate condition as regards seaworthiness, maintenance, and standard of scientific instrumentation, calibration and staffing. If not, a lack of confidence in survey results and the reliability of the entire programme will develop, which in the long term will discourage funding user agencies.

6.2. The Need for a "R/V Dr. Fridtjof Nansen" in the Register

a. Neutrality.

Even if the "Cooperative use of vessels for research, development and training" programme becomes successful, there will be a need for neutral vessels, operating under the auspices of the United Nations, for regional surveys in areas of conflicts or tense relations amongst coastal countries.

A vessel as the "R/V Dr. Fridtjof Nansen" is well suited for such surveys, as it is a high technology vessel with a long operating range, equipped to work independently of land based support; it can cross boundaries between the EEZ's of neighboring countries and, thus, cover the full area of distribution of the fish stocks; it is efficient and experienced, and it is able to provide the quick basic information on resources, which is needed for management decisions in many countries, which are unable to do this on their own.

b. Uniformity.

Use of vessels available from the FAO Research Vessel Register has been suggested. It is argued that if the FAO broker service was used extensively, there would be no need to build a replacement vessel for "R/V Dr. Fridtjof Nansen", and more flexibility in vessel size and equipment would be achieved.

Arguments against this will be a lack of uniformity, continuity and compatibility and, first of all, the fact that it takes years to build up the expertise of both the crew and the scientists, to carry out the demanding and complex work of acoustic and trawl surveys in various areas of the sea.

However, a continuation of the "R/V Dr. Fridtjof Nansen"-programme does not exclude the use of vessels from the register, quite the opposite.

When a number of different research vessels are gathering data on fish resources, using different methods and instruments of different standard and calibration, there will be enormous difficulties in the comparison of results.

A neutral vessel, equipped with well maintained and calibrated equipment of various types, could serve as a reference against which other research vessels could test their results.

The present "R/V Dr. Fridtjof Nansen" is already considered a reference by acoustic survey vessels of developing countries.

c. Motivation and Training.

A technologically comprehensive and advanced vessel would as well serve as a focal point for researchers and operators of research vessels. Generally, researchers in developing countries are neglected as regards training, career opportunities and financial allocations. A situation, which has led to a crippling brain drain.

A new "R/V Dr. Fridtjof Nansen" as a focal point, which offers training, exchange of knowledge, inspiration and encouragement, could help to offset some of the negative impacts of the poor domestic working environment and, possibly, help to retain some of the talented researchers in their much needed positions.

d. Accumulation of Knowledge.

While many developed countries have the required know-how in fish stock assessment, Norway has a special expertise and an extraordinary experience gained during the activities of "R/V Dr. Fridtjof Nansen" over the past 12 1/2 years. Furthermore, Norway is a world leader with regard to development and use of hydro-acoustics in marine resource evaluation.

NORAD and The Fisheries Research Institute in Bergen have a unique expertise in organizing and operating a research vessel on a worldwide scale for resource evaluation. The sum of experience from all the seas where "R/V Dr. Fridtjof Nansen" has operated is invaluable. Should it cease to exist, it may take decades for the developing countries to reach the same level of experience.

If the "R/V Dr. Fridtjof Nansen" project is continued with a replacement vessel, then there is an excellent foundation for a continued accumulation of knowledge. If it is discontinued, valuable and irreplaceable experience and information will be lost, also to the international community.

7. The Impacts of the Ongoing "R/V Dr. Fridtjof Nansen"-Programme on Sector Planning and Fisheries Management in Developing Countries

7.1. Findings of the Evaluations Undertaken in 1982 and 1987

The prime objective of the 1982 evaluation of the "R/V Dr. Fridtjof Nansen"-programme was to measure the impact of the programme on the elaboration of fisheries sector development plans and fisheries management plans in the developing countries.

Therefore, the main tasks of the evaluation team were:

- To assess the quality and relevance of the survey reports and the form of presentation applied.

- To assess the actual or planned use of the resource information from the reports, in the working out of fisheries plans and for related purposes.

Based on:

a) visits to 6 developing countries where the EEZ's had been extensively surveyed by the "R/V Dr. Fridtjof Nansen", and interviews with government officials, responsible for fisheries sector planning and management.

b) consultations with FAO and CECAF key personnel, and

c) replies from 29 countries on a questionnaire submitted to the 39 countries comprised in the survey activities undertaken up to 1982, the evaluation team found:

1. That in 3 countries, Burma, Sri Lanka and Indonesia, over-optimistic sector development plans had been revised on the basis of the resource estimates provided by the "R/V Dr. Fridtjof Nansen". In Sri Lanka and Indonesia, it was possible to adjust the plans prior to the launching of huge in vestment projects within the fisheries sector; whereas in the case of Burma, the "R/V Dr. Fridtjof Nansen" came too late to prevent the exorbitant investments, made shortly before, in the development of an industrial trawler fleet, for which the catch possibilities were scantily documented.

2. The use of "R/V Dr. Fridtjof Nansen" survey data appeared in most of the fisheries development plans for the countries visited. The answers to the questionnaire from other countries confirmed this use of the survey data.

3. That the survey data provided were not appropriate for the planning of how to develop the fisheries sector and exploit the resources identified. The reason for this shortcoming being that the "R/V Dr. Fridtjof Nansen" had only to a very limited extent undertaken experimental fishing and, therefore, not provided the countries with any information on the catchability of the resources, or on the fishing technology to be applied for the efficient exploitation of the resources.

4. That managers of fishing enterprises in developing countries, inclusive of state owned enterprises, were often not informed of the survey results, even if they were the people most capable of assuming the practical implications of the survey results, and act on them in their commercial activities as well as in their planning activities. The reason for this was the lack of appropriate follow-up activities, which was the responsibility of FAO, and the restrictions on the dissemination of survey reports demanded by many governments.

5. That only in those developing countries, which undertake marine research on their own and which employ marine researchers of a high professional standard, have the survey results been used as outset for further research and/or for research training purposes. Pakistan, Kenya and Mozambique are examples hereof. Where these conditions have not been fulfilled, e.g. Somalia, no capacity building has taken place as a spin off of the survey activities.

6. That a total of 15 man-year of training had been given onboard the "R/V Dr. Fridtjof Nansen" to a vast number of marine researchers from the countries which waters had been surveyed.

7. That only those researchers, who had the appropriate scientific background, and who had had the opportunity to prepare themselves on the survey activities to be undertaken, prior to entering the vessel, were able to benefit from their participation on the survey cruises. Where this had not been the case, the participation had most often led to disappointment on the part of the trainee, and to alienation to the scientific methodologies used.

8. That the impact of the survey activities on the fisheries sector development planning is likely to increase with the survey effort undertaken (i.e. the number of days spent in the waters of the country in question, and the survey activities undertaken), and the degree of active involvement of local marine scientists in the survey work, inclusive of the drawing up of survey reports. Mozambique is a good example hereof.

9. That the development within fisheries research institutions in developing countries, which has been initiated by the presence and the survey activities of the "R/V Dr. Fridtjof Nansen", has not automatically led to a development within the fishing industry. Often, the barrier between marine research institutions and the fishing industry, and the barrier between researchers and staff members of government bodies, responsible for fisheries planning and management, have proven to be almost insurmountable - a situation which is not unknown in the industrialized countries as well!

The 1987 evaluation of the future need for the deployment of fisheries research vessels has only to a very limited extent investigated the specific impacts of the "R/V Dr. Fridtjof Nansen"-programme on the elaboration of fisheries development plans, and on the post survey developments of the fisheries sector of the surveyed countries. However, the evaluation team interviewed major donor agencies, such as UNDP, the World Bank, the Asian Development Bank, the African Development Bank, the Inter-American Development Bank, the Commission of the European Communities, and the Overseas Development Administration, UK, to investigate their use of research vessel survey information.

The result of the interviews made it clear that these agencies, to a very large extent, are making use of the "R/V Dr. Fridtjof Nansen" survey reports in their appraisal of fisheries development proposals, for which their assistance is requested by developing countries.

7.2. Additional Findings of the Present Study

Within the scope of the present evaluation, the consultants have only to a limited extent been able to complement and expand the findings of the previous evaluations, as regards the impact of the "R/V Dr. Fridtjof Nansen" survey reports on the elaboration of fisheries sector development plans, as well as the use of the survey information by international donor agencies for project appraisal purposes.

However, based on the investigations undertaken and on the consultants' experience from undertaking fisheries project appraisals, and project and sector evaluations for various international and bilateral donors, the findings of the previous evaluations on this issue can only be confirmed.

Often, the reports from the "R/V Dr. Fridtjof Nansen" cruises are considered the only reliable source of information on the abundance and distribution of the marine resources in the EEZ's of the countries applying for external assistance. This especially counts for information on off-shore resources.

The donor agencies' extensive use of "R/V Dr. Fridtjof Nansen" survey reports implies that these reports have an indirect but rather decisive impact on the realization of those fishing industry development plans and projects, which need external funding. Most development projects within the fisheries sectors of the developing countries, and in particular such projects, which aim at exploiting off-shore resources, are funded by international donor agencies, or by other external sources. It is, therefore, quite obvious that the survey reports have a much greater impact on the development of the fisheries sector, than can be assessed from the developing countries' own use of the information provided.

In this context, it should be added that also bilateral donor agencies funding fisheries development projects, to a large extent make use of the survey reports of the "R/V Dr. Fridtjof Nansen" for the same reasons as quoted by the international donor agencies.

The consultants have observed that the critical statements of the 1983 evaluation report, as regards the lack of follow-up activities on the completed surveys, have been countered by positive actions of IMR and NORAD, who to a large extent have taken over the responsibilities of FAO for follow-up activities.

Since 1984, follow-up seminars have been an integral part of the survey programme activities. Five regional or national seminars have been held at the termination of the major cruise programs. Four of these seminars have been organized by IMR with the assistance of FAO, and have all been funded by NORAD. The follow-up activities on the West Africa survey programme, conducted in 1986, have been organized by CECAF, within the framework of the said organization's cooperation with its member states.

When organizing the follow-up seminars, it has been found essential to focus, not only on the results of the "R/V Dr. Fridtjof Nansen" surveys, but to present and discuss the results in a wider fisheries sector development context, i.e. their implications as regards the development of the commercial fisheries, resource management, the need for future marine research, etc.

Normally, the seminars have had a duration of 3 to 4 days, and they have all been well attended by government authorities, inclusive of responsible ministers, representatives of private fishing industry organizations, international donor agencies, such as UNDP and FAO, marine researchers and others.

Even if no exact documentation has been collected on the impact of these seminars on the elaboration of sector plans, management schemes, etc., the IMR has, over the years, received very positive feedback from all groups of attendants.

The consultants have no doubts that the seminars have spread the knowledge about the "R/V Dr. Fridtjof Nansen" survey to authorities, responsible for the formulation of sector development policies and plans in the countries in question, and to the representatives of the fishing industry. This target group has, thus, been made aware of the results of the "R/V Dr. Fridtjof Nansen" surveys, as well as of the results of other surveys and their implications as to e.g. the dimensioning of the sector development.

Whereas the "R/V Dr. Fridtjof Nansen" surveys, in some cases, are the only surveys of their kind undertaken in specific areas, they are, in other cases, integrated with similar activities under taken by other research vessels within a survey and research programme, funded from national and international sources.

An example hereof are the surveys undertaken by "R/V Dr. Fridtjof Nansen" in West Africa, which constituted an integral part of a comprehensive survey programme, elaborated by CECAF and involving several research vessels, national as well as European.

The use of the "R/V Dr. Fridtjof Nansen" for inter-calibration of survey instrumentation with other research vessels has been extensively forthcoming.

The surveys, undertaken by "R/V Dr. Fridtjof Nansen" in Central America in 1987, have initiated the launching of a NORAD funded regional development project, aiming at a future coordinated extension of the resource assessment activities undertaken by the national marine research institutions in Colombia, El Salvador, Guatemala, Honduras and Nicaragua, and at the assessment of the fisheries sector development implications of the scientific observations.

The consultants have learned from various sources that the very presence of the "R/V Dr. Fridtjof Nansen" in national waters, and the vessel's cooperation with local research institutions, have been a very valuable stimulus to the staff of those institutions, which, in many developing countries, have experienced deteriorating working conditions and decreasing governmental attention to their professional capabilities. Also, the follow-up activities have accomplished an upgrading of government authorities' recognition of the relevance of marine research for practical purposes.

Taken into consideration the very nature of most of the results of the "R/V Dr. Fridtjof Nansen" surveys (i.e. written survey reports), it seems rather doubtful whether a new comprehensive in-depth investigation of the impact of the fish stock assessment work, carried out on sector planning and resource management, will produce so much more exact evidence of the impact, that the costs of the investigation would be justified.

Nevertheless, the consultants find it appropriate if an evaluation is made of the impact of the "R/V Dr. Fridtjof Nansen" survey activities in those countries/regions, where follow-up activities have been undertaken. This evaluation would include Mozambique, Tanzania, Kenya, Angola and possibly the CECAF member states, whereas an impact evaluation in Central America is considered premature. The evaluation suggested should specifically aim at measuring the effect of the follow-up activities, and recommend on their possible improvement in a new "R/V Dr. Fridtjof Nansen"-programme.

8. Critical Discussion of the Proposal of a Renewed "R/V Dr. Fridtjof Nansen"-Programme

8.1. Major Recommendations of the 1987 Evaluation

Even if the objectives of the evaluation were broadly formulated, the 1987 evaluation concentrated on assessing the need for an extension of the "R/V Dr. Fridtjof Nansen"- programme for a new 15 year period, and the construction of a replacement vessel.

This evaluation, which also took into consideration the conclusions and recommendations from the 1983 evaluation, made the following major recommendations:

1. That the surveys initiated by the "R/V Dr. Fridtjof Nansen"-programme should be continued by a new ocean going replacement vessel.

2. That the replacement vessel should be outfitted for research and surveys of off-shore marine resources in particular.

3. That research and surveys of inshore (coast near) resources should simultaneously be undertaken by national research vessels or through the charter of appropriate vessels. Where necessary, specialized equipment should be loaned to such vessels from the "R/V Dr. Fridtjof Nansen".

4. That funds for the extension of the "R/V Dr. Fridtjof Nansen" -programme should include continuing research into survey technology and methodology, especially when inshore marine resources are concerned.

5. That a number of specific actions should be taken to improve the planning and execution of the research and survey activities, and provide for the best use of the results by all relevant parties.

Among these specific actions were (ref. Annex II):

a. Establishment of a programme unit within FAO, responsible for programme planning and execution, and programme coordination with related activities, e.g. projects funded by other donor agencies.

b Appointment of national coordinators in the countries where the vessel would operate.

c. Introduction of 2 or 3 levels of programme reporting, each aiming at specific target groups, i.e. scientists, administrators and planners, private industry, and speeding up of the dissemination of survey vessels.

d. Dissemination of survey results to other donor agencies, which might be interested in funding various follow-up activities, such as experimental fishing, continuation of national survey activities, etc.

e. Computer storage of all core survey data for future reference and analysis.

6. That on-board training should be restricted to providing working experience to selected nationals, and that training in specific technologies and methodologies should only be offered to personsonnel qualified to profit from and contribute to the scientific activities undertaken.

7. That NORAD-funding of follow-up seminars and conferences should be continued.

8.2. Discussion of the 1987 Recommendations

The findings of the 1987 evaluation are supported by the present review team with the following supplementary comments.

Ad 3 Re: Inshore surveys.

Inshore surveys are important in many areas. How far "inshore" a new "R/V Dr. Fridtjof Nansen" may operate, depends on the draught of the vessel, the experience of the captain and the local hydrographic and sea-bed conditions.

When supplementary inshore surveys are needed, i.e. where important resources and fisheries are found outside the range of "R/V Dr. Fridtjof Nansen", it should be carefully considered during the planning of the survey, how this might best be done. The use of national or chartered research vessels, as suggested in the recommendations from the previous evaluations of the project, may not always be the best solution. The difference between how close to the shore an e.g. 50 meter long vessel and a 25 meter long vessel can operate may in many cases be marginal.

The loan of acoustic equipment to smaller vessels for inshore surveys presents some inherent problems concerning compatibility of the instruments.

A better solution, from a scientific point of view, could be to use a boat of a suitable size for inshore acoustic surveys, and for transportation on board the "R/V Dr. Fridtjof Nansen". In that way, the problem of instrumentation coordination and reliability may be minimized.

However, trawl surveys for demersal species may very well be carried out by national or chartered minor research vessels, as a supplement to the surveys made by "R/V Dr. Fridtjof Nansen".

Ad 4 Re: Research in survey technology.

With the very rapid development, which takes place in the technology and methodology of acoustic surveys, continuous research by those who carry out such surveys is of paramount importance. Split beam systems, which give much more detailed information, development of portable systems suitable for inshore surveys etc., are examples of this development. It is also important that the results of research carried out by the "R/V Dr. Fridtjof Nansen"-programme be pursued and discussed at international scientific meetings, to ensure that the performance remains at a top level.

Ad 5 Re: Specific actions.

(a) A continued involvement of FAO seems to be indispensable for coordination with other activities, like the FAO/DANIDA training courses or regional projects, like the Bay of Bengal Project, the South West India Ocean Project etc., which all have important elements of re- search and management. Also bilateral projects and projects funded by other international agencies, like EEC, World Bank etc., deal with fisheries research and management.

(b) National coordinators should be appointed prior to actual cruise planning, to allow them to take an active part in the planning of the survey programme and to carry out the preparatory studies for the programme.

(c) Communication of results at 2 or 3 levels to scientists, administrators and planners, as well as private industry, is an extremely important issue. If the results cannot be properly communicated to the user, they may be completely without value. Communication is the responsibility of the sender, who has to make sure that the receiver gets the messages. This is often neglected by scientists communicating with persons outside the scientific forum. Much attention should be paid to this issue when the programme is continued.

(e) Computer storage of all core survey data for future references and analyses. This is important in the context of future development of new assessment techniques, the global monitoring of resources and environment, and for contribution to national or regional research programmes by provision of time series of data. Data should be stored, so that it may be transferred to Personal Computers in the national laboratories of the developing countries.

Ad 7 Re: NORAD funding of follow-up activities.

Seminars and conferences are relevant follow-up activities. It is important to coordinate with other on-going fisheries research activities in the regions.

8.3. Discussion of Programme Objectives

The overall objective of the "R/V Dr. Fridtjof Nansen"-programme was to assist recipient countries to develop their fishing industries, through the provision of the essential basic data, which they lacked, on the abundance, distribution and seasonality of their fish resources. Further, the programme was to assess the catchability of the resources and, as a secondary task, undertake training.

The 1987 report does not review the objectives of the "R/V Dr. Fridtjof Nansen"-programme, however it is written between the lines that the programme has grossly failed to assess the catchability of the resources identified.

Among the main reasons for this are:

- the priority given by IMR to resource assessment when planning the operations of the vessel,

- the lack of expertise within IMR on fishery technology,

- the inappropriate design and equipment of the vessel for experimental fishing.

The original objectives are still valid, but a continuation of the programme should be based on some basic rethinking, which should, amongst other, include the formulation of a number of success criteria.

The success of the "R/V Dr.Fridtjof Nansen"-programme should be gauged by its impact on the industry and government's use of the results for fisheries development and for the protection of the resources and environment. The proper use of the survey results is as important as the quality and quantity of data.

The goals for each survey programme should be pre-determined and quantified as far as possible. It may not be possible to quantify the overall targets for the "R/V Dr.Fridtjof Nansen"-programme over a 15 year period. However, when the countries and regions have been identified for a survey programme and when any complementary projects have been formulated, it is possible to set a number of quantified success criteria.

The consultants have prepared a general Logical Framework for the "R/V Dr.Fridtjof Nansen"-programme which can serve as an inspiration to the planners of a future programme. The Logical Framework is presented in Annex VII.

As the success of the "R/V Dr.Fridtjof Nansen"-programme depends very much on the proper application and use of the survey data, the programme should be put in perspective, in the sense that it should be integrated with other concurrent activities and projects, which will enhance the value of the survey data to the developing countries.

Possible concurrent activities and projects (sponsored by other donors) could be the provision of Technical Assistance for the elaboration of Fisheries Development and Management Plans, establishment of Fisheries Monitoring System, finding of projects for the national exploitation of off-shore fish resources etc.

To enable an infant industry to directly utilize survey data, higher emphasis should be put on experimental fishing as an integral part of the survey programmes and, as a consequence hereof, the new "R/V Dr. Fridtjof Nansen" should be equipped for (and undertake) extensive commercial experimental fishing. It should in principle be designed more as a fishing vessel, capable of undertaking fisheries research, as opposed to a research vessel, capable of experimental fishing.

As the "R/V Dr.Fridtjof Nansen" is not suited for inshore surveys, the programme should be designed to accommodate in-shore survey work either through cooperation with other donors and other research vessels, or through own cooperation with local vessels, or use of a "piggy back" vessel - a small vessel carried on board the "R/V Dr. Fridtjof Nansen".

8.4. Discussion of Programme Structure

The 1987 evaluation report concludes that the "R/V Dr. Fridtjof Nansen" programme should be continued, and that the FAO planning and coordination capacity should be strengthened.

The proposed strengthening is a consequence of the unsatisfactory coordinating role of FAO during the last 12 1/2 years.

In accordance with the agreements between NORAD, FAO and IMR, the "R/V Dr. Fridtjof Nansen" should be placed at the disposal of FAO, but in practice, the vessel has, for several periods, been bilaterally placed at the disposal of NORAD. This has partly been caused by the need for resource assessments, linked to planned and ongoing NORAD funded fisheries development projects (e.g. Mbegani Fisheries Development Centre, Tanzania), and partly by the inability of FAO to establish the long term plans for the vessel operations, and to raise the funds to cover its share of the vessel operation costs.

FAO's organizational capacity in the next 15 years is unpredictable, due to the organization's difficult financial situation. If the present trend continues, one cannot expect a cost effective operational assistance from FAO in Rome, in spite of the proposed strengthening. Therefore, NORAD themselves must be prepared to fully organize and finance operations, and follow-up activities in the future.

Experience from the 12 1/2 years of operation shows that the programme has been most successful where it has been part of a larger project, and where the efforts have been intensively directed towards a confined geographical area.

In spite of the difficulties FAO is facing, the organization must be recognized for its unique network of contacts to developing countries, and the valuable expertise it possesses. Therefore, FAO should have a continued involvement in the project, but the operational and coordinating centre should be established in Bergen at the IMR and not in Rome. Such a step would only be an institutionalization of the current practice.

The present symbolic funding from UNDP should be retained to ensure that the new "R/V Dr. Fridtjof Nansen" can operate under the UN auspices and thus remain "neutral".

8.5. Discussion of a Possible Coordinated Nordic Fisheries Resource Assessment and Management Effort, Inclusive of a New "R/V Dr.Fridtjof Nansen"

Other Nordic countries are also supporting fisheries research in developing countries.

A FAO project, financed by DANIDA, trains fisheries scientists in stock assessment, and research institute directors in research management. (See Appendix VIII). ICEIDA has a small fisheries research vessel stationed in Cap Verde, which will be available for inshore marine surveys elsewhere as of 1989.

A renewed "R/V Dr. Fridtjof Nansen"-programme would be an excellent opportunity for a coordinated Nordic involvement in fisheries research. The cooperation should be flexible and informal, in order to avoid the negative effects bureaucracy may impose. In fact, the vehicle for such informal cooperation already exists in the form of regular coordination meetings, held by the fisheries experts of the Nordic development aid agencies.

It may be considered to have this item on the agenda of the forthcoming meeting in May 1989.

An inter-nordic coordinated approach would enlarge the available expertise and facilities, make it possible to plan jointly and to implement complementary programmes within a common framework. This would increase the impact considerably.

Possible complementary programmes for a given area could for example be:

NORAD: Continuation of the "R/V Dr. Fridtjof Nansen"-programme.

DANIDA: Follow-up of the FAO/DANIDA fisheries assessment training project. (See Appendix VIII).
Preparation of model feasibility studies to enhance commercialization and domestic investment in new fisheries.

ICEIDA: Complementary (inshore) surveys in areas where the "R/V Dr. Fridtjof Nansen" is operating. Experimental Fishing.

SIDA: Experimental fishing in shallow waters and training in species identification.

Namibia's forthcoming independence of South African administration presents an unique opportunity for such a coordinated development aid project. The waters off the Namibian coast are known to be very rich. The living marine resources constitute a substantial source of income and nutrition for Namibia. It is to be expected that "impartial" foreign assistance will be required for the development of a well managed domestic fishery. The "R/V Dr. Fridtjof Nansen" surveys in Angolan waters could be extended to also cover Namibian waters, and the Icelandic survey vessel Fengur could concurrently undertake inshore surveys in both countries. Danida could assist with sector development planning and institution building, etc.

8.6. Discussion of Compatibility with NORAD Aid Policies and Priorities

The overall policies of Norwegian development aid are summarized in the "Recommendation No 196 to the Storting by the Standing Committee on Foreign Affairs and the Constitution Relating to Key Issues of Norwegian Development Cooperation".

This document states the poverty orientation of Norwegian aid policy, the priority given to development within the basic needs sectors, the concern for proper management of natural resources and the environment, and the priority given to research in this particular field. The document also mentions fishing among four sectors where Norway is particularly qualified to provide technical assistance.

The "R/V Dr. Fridtjof Nansen"-programme, as planned and implemented, fits very well with most of these policies and priorities, even if they were not as specifically formulated at the time the programme was launched.

Since the programme aims at the development of developing countries' fishery sector, the "R/V Dr. Fridtjof Nansen"-programme is within one of the sectors where Norway has outstanding technical competence. The qualifications of Norwegian fisheries' biologists are worldwide recognized, especially in the field of assessment of fish stocks.

The immediate objectives of the "R/V Dr. Fridtjof Nansen"-programme, to provide the developing countries with marine resource data and information, on which to base the working out and implementation of fisheries management plans, are fully in accordance with one of the highest ranking Norwegian aid priorities, namely the assistance to the developing countries in protecting their renewable natural resources.

It is a well established fact that the paramount ecological issue, related to the exploitation of living marine resources, is that of proper resource management. The detrimental consequences of mismanagement of fish resources are already well known in the industrialized world, and in the countries bordering the North East Atlantic in particular. The consequences for the developing countries of fish stock breakdowns, caused by overfishing, are far more catastrophic, taken into consideration the importance of fish as human food in most of these countries.

The priority given to research activities, related to the management of natural resources and the environment, is met by the research orientation of the "R/V Dr. Fridtjof Nansen"-programme activities. Not only have the survey activities in themselves aimed at the establishment of proper management regimes for the fish resources, but the work has, wherever feasible, been undertaken in close collaboration with local research institutions. Many local fisheries scientists have thus been trained in fish stock assessment methodology on-board the "R/V Dr. Fridtjof Nansen".

In this respect, the programme comprises an important element of institution building, which - other things being equal - has increased the capabilities of the staff of local research institutions to undertake fish stock assessment. The Norwegian support to follow-up activities and/or complementary activities, e.g. support for fisheries research institutions in Mozambique and Central America, has increased that capability, thus circumventing the said fact, that all things have not been equal when the situation of fisheries research institutions in developing countries is concerned.

One of the fundamental principles of Norwegian development aid is the principle of poverty orientation. Hereby is understood that Norwegian aid should preferably be allocated to the poorest developing countries, and be used to create the greatest possible development effect for the poorer segments of the population.

When looking at the outline on page 8 of the coastal countries, whose waters have been surveyed by the "R/V Dr. Fridtjof Nansen", it appears that most of the countries belong to the group of poorest and least developed, the so-called LDCs.

The "R/V Dr. Fridtjof Nansen" has specifically been designed for surveying off-shore fish resources, i.e. resources which are normally exploited by industrial fishing vessels. The survey programmes have, for technical and methodological reasons, never comprised the coast near living marine resources, which are predominantly exploited by artisanal fishermen.

In most developing countries, artisanal fishermen and their dependents are belonging to the poorest segment of the population, not only in economic, but also in social terms. This position of artisanal fisherfolk at the bottom of the social hierarchy in most developing countries is identical to what was the situation in the industrialized coastal countries a few generations back.

The importance of artisanal fisheries as suppliers of fish for human consumption can hardly be exaggerated. In many developing countries, artisanal catches by far surmount the catches of industrial fishing vessels, and these catches are quantitatively much more stable over time than industrial catches.

Irrespective of its nutritional importance, very little attention is, in general, paid to artisanal fisheries by the political authorities of the developing countries.

This has implied that little effort has been invested in the formulation and implementation of development plans for this subsector. It also implies that very little effort has been invested in the formulation of fisheries management plans for coast near resources, not to mention the execution of such plans.

It is, however, a well recognized fact that many of the fish stocks exploited by artisanal fishermen in the developing countries are overfished or exposed to overfishing, as a result of ever increasing fishing efforts. It is, thus, also recognized by FAO, the donor organizations and also most national fisheries authorities in the developing countries, that the most urgent need is for assessment and monitoring of coast near marine resources, and for proper management of these resources.

Based on these facts, it appears that the "R/V Dr. Fridtjof Nansen" -programme has not, or only marginally, benefitted the poorer segments of the population of the developing countries. The subsector, which has benefitted from the programme activities, is the industrialized subsector. Further, it is most likely that those who have benefitted the most, especially in the short and medium term, are industrialized joint venture fishing enterprises, or fishing enterprises of the industrialized countries exploiting the EEZ's of the developing countries on licence arrangements.

9. Cost Estimates

9.1. Introduction to Cost Estimates

During the course of the study, discussions were held with staff members of the Institute of Marine Research in Bergen, in order to establish the specifications of a new "R/V Dr. Fridtjof Nansen", under the assumption that the recommendations of the 1987 Evaluation Report were to be followed.

The staff were given the opportunity to state their opinion of the specification for a vessel, which could continue the "R/V Dr. Fridtjof Nansen"-programme.

The consultants are in agreement with the IMR in this respect and only wish to state that the vessel should also have improved fishing capabilities.

Outline specifications for a new "R/V Dr.Fridtjof Nansen" have been drawn up in the following chapter and the cost of building and operating such a vessel, including scientific instruments, fishing gear etc., is estimated in the same chapter.

When the draft report was presented to the Ministry of Development Cooperation in December 1988, a briefly stated idea of the report caught the interest of the Ministry. The consultants were subsequently asked to estimate the cost consequences of such an idea.

The idea concerned the possibility of carrying a smaller survey ship on board the new "R/V Dr. Fridtjof Nansen", which could survey shallow waters of the coastal areas where the larger vessel cannot operate. This proposal was named the "Piggy-Back"-option.

A rule of thumb for larger acoustic research vessels is that the vessel cannot collect reliable data on depths less than 3 times the draft of the vessel, and in the case of the new "R/V Dr. Fridtjof Nansen" this implies that the minimum survey depth is 15 m, and that the "Piggy Back" vessel will at least survey depths below 15 m.

The cost of building and operating the vessels of the "Piggy Back" vessels is estimated below in chapter 9.3.

The report recommends that the headquarter for the "R/V Dr.Fridtjof Nansen"-Programme be situated in Bergen at the Institute of Marine Research. The costs involved in the planning and follow-up work etc. has been estimated, and is presented in chapter 9.4 below.

9.2. Estimates Based on the 1987 Evaluation Report

9.2.1. Specifications

General Dimensions:	Length (overall)	54m
	Width (overall)	12m
	Draught less than	5m
Classification:	Research Vessel or Fishing Vessel.	
Speed:	Max 14 knots, steaming at 11 knots.	
Crew and accommodation:	Max. 27 in single cabins, hereof 20 crew, 5 scientists and 2 trainees.	
Fishing Equipment:	Trawl, line, nets and traps.	
Mayor Survey Equipment:	CTD sensor, water sampler, 2 units echo sounders (Ekko 600), EDP processing and network, Sonar SA950 (95 kHz), Scanmar system, trawl sensor.	

Propulsion and Navigational Equipment:	Unmanned machine room, main engine suitable for heavy fuel oil, bow propeller, which can be used for propulsion in case of emergency, Becker rudder.
Special Nautical Equipment:	Satellite navigation, satellite telephone, two radars (3cm,10cm).
Power:	UPS system 220V, 48V + 110V backup, 5-10 kVA.
Laboratories:	Fishlab., chemical lab. and hydrographic. lab.
Operational Profile:	The vessel will operate with two crews, which will enable it to be at sea for 8 months and in port for 4 months of the year. During survey work, the vessel will do 11 knots, except for approximately 6 hours per day, where it will be test trawling at up to 5 knots.

9.2.2. Cost Estimates

Capital costs: (Details in Annex III)

Vessel, built on the free market 1988:	NOK	60 million
Instruments:		5
Fishing gear		3
Total	NOK	68 million

Operational Costs:

The operational costs of a new "R/V Dr. Fridtjof Nansen", built in accordance with the above outline specifications, and with an operational profile very similar to that of the existing "R/V Dr. Fridtjof Nansen", would be of the same order of magnitude. The crew expenditure will be slightly higher, as the number of crew would increase from 15 to 20. On the other hand, the fuel costs would, due to a more efficient propulsion unit, be slightly reduced in spite of the vessel being longer.

Substantial savings could be made in the operational costs if the new "R/V Dr. Fridtjof Nansen" is registered in "Norsk International Skipsregister", as subordinate crew members could be hired from the region where the vessel is operating.

The crew wages and travel accounts represent an annual amount of some 7 million NOK, and it is believed that this amount could be reduced to some 4 million NOK by employing crew from the develop ing countries. This would, however, have to be verified. Such a step would also create added goodwill in the recipient countries for the work of "R/V Dr. Fridtjof Nansen".

The operational costs of the existing "R/V Dr. Fridtjof Nansen" have been analyzed for the years 1982 - 88 and converted to 1988 NOK by multiplication with the rate of inflation for the individual series of years. The details of this analysis are enclosed in Annex IV, but the result is that the operational costs have been fairly constant over the years - in 1988 NOK - at around 16 million NOK.

9.3. Estimates Based on the "Piggy Back"-Proposal

9.3.1. Specifications

It will not be necessary to alter the specifications for the new "R/V Dr. Fridtjof Nansen" in order to accommodate the so-called "piggy back" vessel on board. Thus, the cost and specifications of the mother ship will remain as outlined in chapter 9.2.

The "piggy back" vessel will be equipped for acoustic surveys of shallow waters. The sensors will be mounted on a towed body to eliminate the effects of vessel movement on the measurements. The acoustics instruments and records will be linked to a satellite navigation system, to enable automatic simultaneous logging of survey data, time and position.

The vessel will have a small working area for measuring of fish caught during trial fishing with nets and line.

The vessel will be too small for commercial trawl, but a small trawl will be used for sampling of fish fry.

The vessel used for the cost estimates has the following general specifications:

General Dimensions:	Length	9,29 m
	Beam	3,25 m
	Draft	1,20 m
Classification:	Fishing vessel	
Speed:	Service speed 8 knots	
Crew:	1 master & 1 operator	
Fishing Equipment:	Test Trawl, lines, nets	

Major Survey Equipment: CTD sensor, echo sounder 38 KHz acoustic split beam equipment with sensors mounted on a towed body

Propulsion: 120 hp diesel

Special Nautical Equipment: Satellite navigation

9.3.2. **Cost Estimates**

Capital Costs: (Details in Annex III)

Mother vessel (as in 9.2.2)	NOK 68 million
"Piggy Back" vessel incl. crane for lifting on-board	2 million
Acoustic equipment, etc.	1 million
	NOK 71 million

Operational Costs:

It will not be possible to give an accurate estimate of the operational cost of the "piggy back" vessel without knowledge of its operational profile.

For budgetary purposes, it is estimated that the annual cost of operating the vessel would amount to 1.5 million NOK, incl. crew expenses, fuel, maintenance and gear replacements. It is likely that the "piggy back" vessel operation could undertake surveys in some areas, which would otherwise be surveyed by the mother vessel at a lower cost - and there is thus scope for some savings in the operational cost of the mother vessel.

9.4. Operational and Administrative Costs

The direct costs to the Institute of Marine Research of follow up activities over the last years have been of the order of 250.000 NOK. An allowance should be made for active participation of the recipient countries in cruise and survey planning and follow-up, including the sponsoring of seminars, pre-survey courses and interpretation and presentation of results to all relevant sectors of the recipient country. Further, the methodology and technology used on the cruises should be published in international journals, in order to open up a discussion of the appropriateness of the methods and the reliability of the results.

The budget for such comprehensive planning and follow-up activities will, of course, depend on the extent and frequency of such activities. However, for the purpose of arriving at a budget figure, the annual amount of 3 million 1988 NOK has been included in the budget below:

Summary of costs - 1987 Proposal:

Vessel cost:	60 million NOK
Scientific instruments:	5
Fishing gear:	3
Operation, 15 years @ 19 million	285
Total	**353 million NOK**

Summary of costs -"Piggy Back" Proposal:

Mother vessel	68 million NOK
Piggy Back vessel	2
Scientific instruments	1
Operation, 15 years @ 20,5 million	308
Total	**379 million NOK**

ANNEX I

Summary of the Conclusions and Recommendations
of the 1983 Evaluation

(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, especially 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.

9. 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 catchability 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.

ANNEX II

Summary of the Conclusions and Recommendations
of the 1987 Evaluation of the R/V Dr. Fridtjof Nansen

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Conclusions.

1. The information already gained by the R/V "Dr. Fridtjof Nansen" in the course of its research and survey operations has made a considerable contribution to the present state of knowledge on the magnitude and distribution of various marine fish resources in the waters of a number of developing countries. This contribution has been widely appreciated both by the governments of the countries concerned, and by development and funding agencies and regional bodies who have utilised this information in planning their programmes of assistance to the fisheries sector in these countries. Not least of the achievements of the R/V "Dr. Fridtjof Nansen" has been that of providing reliable resources information which prevented a number of developing countries from committing themselves to over-investment in large scale industrial fisheries projects based on previous erroneous and over optimistic resource assessment studies.

2. There is widespread support from the developing countries and from developing and funding agencies for the continuation of the R/V "Dr Fridtjof Nansen" programme. The conclusions of the 1984 World Conference on Fisheries Management and Development and the investigations undertaken in the course of this study also confirm the need for the continuation of a programme of marine resource assessment to assist developing countries in planning their fisheries management and development programmes, and to assist development and funding agencies in planning related programmes of assistance to these countries.

3. The long term programme of marine resources assessment initiated by R/V "Dr. Fridtjof Nansen" and a continuation of that programme, as is now being considered, provides a unique service to the developing countries which fills a gap in the normal pattern of international fisheries aid extended to these countries which is necessary if these countries are to maximise the benefits from their marine fisheries.

4. - The research and survey operation of a vessel such as the R/V "Dr. Fridtjof Nansen" and its successor working in close association with, and giving guidance and assistance to, fisheries research institutions in the developing countries will assist in providing these institutions with a greater sense of purpose and direction in the planning and implementation of their work programmes.

5. Basic knowledge of the marine fishery resources is available for all developing countries. Coverage, however, is incomplete with regard to some types of resources, seasons and/or depth/topographic strata. Deficiencies vary from country to country, and between regions. Generally speaking the need for exploratory surveys is limited. Conversely, test fishing to determine "capture" opportunities is greatly needed in many areas. Also in many areas resources are already close to or fully exploited. Accordingly resources monitoring is a priority need for management purposes in all regions, particularly to survey common (or shared) stocks.

6. While catch and effort statistics are indispensible for fisheries management, they complement, but do not replace resource surveys. There will be a continuing and growing demand in both the volume and quality of data required for stock assessment. The current introduction of multispecies models, necessitating data pertaining to the whole ecosystem, also with regard to fish distribution, migration and behaviour, is greatly increasing the needs for direct observations at sea, i.e. vessel survey work.

7. Future surveying techniques and improved instrumentation will provide more reliable and better quantifiable assessments, thereby extending the usefulness of acoustic surveys and overcome at least some of the present shortcomings. Better general knowledge of the resources, and their seasonality in distribution and abundance, will facilitate more rational planning and utilization of vessels for monitoring surveys.

8. The capabilites and physical facilities and capacities for the required survey work vary between regions and countries; and are clearly inadequate for offshore activities. While Mexico, Peru, Chile, Argentina and Brazil posses both suitable research vessels

and most of the expertise required, they all lack funds for operating the vessels and are starting to lose personnel. In the rest of that region outside assistance is required for all aspects of fisheries development and management. In some countries bilateral aid for surveys is forthcoming (e.g. from USSR, W. Germany and U.K.). Outside assistance is required throughout the foreseeable future in Africa; and bilateral aid is available for some countries in that region. Physical facilities are partly available in Arab countries, but foreign expertise is required. India is self-sufficient, but assistance both with regard to vessels and expertise is needed in Pakistan, Sri Lanka, Bangladesh and Burma. Malaysia, Thailand and Indonesia are partly self sufficient, and have access to SEAFDEC facilities, but lack funds for vessel operations and some expertise.

9. Recent investigations undertaken, jointly, by FAO and the Inter-Governmental Oceanographic Commission (IOC-UNESCO) indicate that available research vessel capacity can only meet about one quarter of the requests for marine survey and research from the developing countries. Although these requests emanate from various regions the need seems most apparent in certain African countries which suffer, particularly, from a lack of research vessels and expertise.

10. In production terms the growth of world fisheries between 1970 and 1983, excluding anchoveta, was 22.8 million m.t. or 44% giving an annual average growth rate of 2.8%. In absolute terms the greatest increases took place in the developing countries; in Asia 9.4 million m.t. of which 6.9 million m.t. came from Marine fisheries; Latin America (no anchoveta) 5-4 million m.t. with the smallest increment recorded in Africa, namely 363,000 m.t. or 11,3%. Fish is gaining recognition as an important food and consumption on a per caput basis is steadily growing; from a world average of 7.2 kg/caput in 1950 to almost 12 kg/caput in 1979/80, despite a fast growing world population. Consumption is, however, very uneven between countries, and even within countries. Looking ahead to the year 2000, on the basis of UNESCO population predictions and without any further improvement in dietary standards, there will be need for an additional 19 million m.t. of fish per annum. It is in the less developed countries, which account for 74% of total population and 90% of the annual increase, that the demand for

fish will be greatest. An additional 5 million m.t. per annum will be required to meet needs in South and South-east Asia. There will also be a high demand in Africa, and especially in the western half of the continent,amounting to some 3 million m.t.

11. Having evaluated various criteria, including the status and potential of marine resources, the relative importance of marine fisheries to the countries concerned, the availability of access to research and vessel facilities, the status and strength of national scientific personel; and past programming of the R/V "Dr. Fridtjof Nansen" operations, it is considered that the more immediate and greatest need is more specifically for continuing survey coverage of the eastern Atlantic in the sea areas bordering the western coasts of Africa and in the NW Arabian Sea.

Recommendations.

1. It is recommended that the programme of research and survey of the marine resources of the developing countries, initiated by R/V "Dr. Fridtjof Nansen", be continued with a new replacement vessel, which should be constructed in Norway to commence sea-going operations in 1990. The programme of research and survey to be undertaken by the new vessel should be planned to cover a fifteen year period up to the year 2005.

2. It is recommended that the total costs of constructing the new vessel, and operating it over the suggested period, should be borne by NORAD. These combined costs are estimated at US Dollars 50 million.

3. It is recommended that the replacement vessel should have ocean-going capability and form the basis for a new and more comprehensive research and development programme for the benefit of developing countries. This will allow it to be deployed, as necessary, on a global basis for research and survey of offshore marine resources which should be its prime purpose. Although the new vessel should have the capability to operate in all ocean areas, priority consideration should be given to survey and research operations in the waters of selected countries on the West coast of Africa where there is a need both for continuing and reliable data on which to base fisheries management programmes as

well as to evaluate the potential for long term fisheries development and investment programmes which would contribute to alleviating the food problems of that region. Priority consideration should also be given to continuing survey and research operations in the North West Arabian Sea.

4. It is recommended that a review of available and pending advanced survey technology is initiated so that the new vessel will be equipped with the most versatile and appropriate equipment available.

5. It is recommended that inshore survey coverage in the waters of the countries where the new vessel will operate is obtained by the more effective use of national research vessels and/or through the charter of vessels. It is also recommended that, where necessary, specialised equipment should be loaned to such vessels for the duration of survey operations, and national staff should receive prior training in the use of such equipment.

6. To further improve the quality and value of research and survey data over the duration of the proposed fifteen year programme of the new vessel, it is recommended that consideration be given to providing sufficient funding within the new research programme to include continuing research into survey technology and methodology, especially in respect of inshore surveys.

7. To ensure that the planning and implementation of the proposed research programme is well coordinated and to enhance the prospects of survey and research results being transalated into appropriate management, development and investment programmes, from which the developing countries will benefit:-

a) it is recommended that early action should be initiated to draw up a revised list of planning and operational requirements for the new vessel.

b) it is recommended that adequate "lead-time" is always budgeted for in the planning and prior consultations concerning forward cruise programmes.

c) it is recommended that organisational arrangements decided upon are institutionalised.

d) it is recommended that an "executive" be established within FAO to exercise FAO's responsibilities in the planning and implementation of the research programme, and to assist coordination with other organisations, development and funding agencies, and the countries concerned, by providing a focal point for contact and liaison.

e) it is recommended that "national coordinators" should be formally designated by their governments to institutionalise the procedures and channels of communication between NORAD, IMR and FAO and the countries where the new vessel will operate, and within the countries themselves.

f) it is recommended that the reporting of cruise information and findings is revised so that at least two, and preferably three, levels of reports are issued to meet the needs of scientists, administrators, fisheries planners and private sector interests.

g) it is recommended that the present distribution of reports is revised in order to widen the circulation, access to and use of information and data arising out of research and survey operations.

h) it is recommended that NORAD should give consideration to financing an Associate Expert post who would be attached to and strengthen the proposed FAO "executive".

In order to accelerate development and investment it is recommended that NORAD and FAO keep appropriate regional funding agencies fully informed of survey results; and encourage them to provide support and financial assistance to the countries concerned for desirable follow-up activities such as continuing survey operations, when necessary, or test/semi-commercial fishing.

j) it is recommended that core data from all surveys undertaken by the new vessel should be retained on computer for future reference and reassessment of analyses in the light of new and additional data which may be forthcoming. Copies of such core data should also be made available to the countries concerned, and retained by them should they wish to do so.

k) it is recommended that a Steering Committee is established to

review and advise on the activities of the proposed FAC "executive".

1) it is recommended that, in addition to the activities of the Steering Committee proposed above, the whole research programme of the new vessel should be subject to regular review at, say, five year intervals, a procedure which could be linked with the already established NORAD review procedures.

8. It is recommended that such training as can be carried out on the new vessel should be restricted to:-

a) providing working experience at sea to selected national personnel in general fisheries research methodologies and broad familiarisation with the survey equipment and technology used by the new vessel.

b) sea-going training to selected, national personnel in specific technologies and methodologies employed in the new vessel survey and research programme, when it can be demonstrated that such personnel are, already, qualified to profit from and contribute to the work of the vessel.

9. It is recommended that NORAD should continue to provide funding for the conduct of seminars, workshops and conferences so that participants from countries, or groups of countries, whose waters have been subject to research and survey by the new vessel, can be brought together to discuss the results of such surveys and their implications for fisheries management and development.

ANNEX III

Cost Estimates for Replacement Vessel

CIC-MARINE

Consulting Engineers and Economists A/S

101, Ordrupvej, DK-2920 Charlottenlund
Copenhagen, Denmark
Telephone: +45 1 64 51 11
Telex: 37901 cic dk
Fax: +45 1 64 55 58
A/S Reg. No. 159183

TELEFAX

Covering Letter

09.11.88

TV/ke

TO Knud E. Hansen A/S

ATT. J. M. Nielsen

FAX NO. 01 13 27 20

FROM Torben Vindeløv

SUBJECT R/V Fridtjof Nansen

Hermed oplysninger til brug ved overslag over nybygningspris og driftsomkostninger for et nyt R/V Fridtjof Nansen.

Før i sætter igang med beregningerne skal vi lige aftale, hvor meget tid i skal bruge til arbejdet. Vi skal kun bruge et overslag, og der skal ikke foretages nogen projektering. Vi har regnskabstal for den gamle R/V Fridtjof Nansen, der viser drifts-vedligeholds-og lønomkostninger siden 1982.

Dødvægt:	Anslået til ca. 1800 ton
Tid på søen:	30 dage
Fart:	Max 14 knob, march fart 11 knob
Nyttelast:	Skibet skal kun fragte videnskabeligt udstyr og mandskab.
Længde overalt:	Ca. 54 m
Bredde:	12 m
Dybgang:	Mindre end 5 m

Total number of pages (incl. this page): 3

If you do not receive all pages, please call 45 1 64 51 11

Isklasse:	Skibet skal ikke sejle i is, men man vil gerne have et kraftigt skrog - evt. et galvaniseret skrog da skibet skal sejle i troperne.
Klassebetegnelser:	Klassificeres som forskningsfartøj R/V eller som fiskefartøj.
Størrelse af besætning incl. forskere:	Max 27 alle i single kabiner. Heraf 20 besætningsmedlemmer, 5 forskere og to elever.
Service fart:	11 knob.
Operationsprofil:	Skibet vil operere med to besætninger og vil være på togt 8 mdr. og i havn 4 mdr.. Det kan antages at skibet sejler 11 knob fuld tid med undtagelse under trawling som sker i ca. 6 timer pr. døgn.
Fiskeudstyr:	Trawl, line, garn, ruser og traps.
Kraner:	1 stk. 5 ton * 13 m på fordækket, 3 stk. 1,5 ton * 10 m, en midtskibs til udsætning af videnskabelige sonder m.v. og to agter til håndtering af bl.a. trawldøre. (Muligvis ekstravagant med 3 kraner iflg. en af forskerne).
Dykkerudstyr:	2 dykkersæt samt kompressor m.v. til påfyldning af trykflasker. Intet avanceret dykkerudstyr ombord.
Helikopter:	Ingen.
Fryse-/lastrum:	1. proviantrum samt 1. fiske-fryserum til 2 tons fisk, vol. 8 m^2 med en indfrysningskapacitet på 200 kg./døgn og en rumtemp. på -20°C.
Bov propel:	1 stk. med en effekt på 300 - 400 kW. Propellen bør være af en type der kan benyttes til nødfremdrift.
Ror:	Beckerror.
Passagerer:	Højst 2 elever. Disse er indregnet i de 27 nævnt ovenfor.
Redningsmidler:	Til Veritas standard.

Bugsering: Skibet skal ikke benyttes som bugseringsbåd.

Nautisk udstyr: Satelit navigation, satelit telefon og to radar en 3 cm og en 10 cm og ellers iflg. forskrifter.

Strøm og spænding: UPS system 220 V (hvis akselgenerator) 48 V + 110 V backup. Effekt 5-10 kVA.

Motor: Diesel, tung olie (tung olie vil dog ikke blive benyttet - ikke mere prisfordelagtigt). Maskinrummet skal være ubemandet.

Hospital m.v.: Nej, kun minimumsforskrifterne.

Laboratorier: Fiskelaboratorium, 6-7 m^2 evt. som et glasindelukket shelter på dæk. Kemisk laboratorium, 10 m^2 temperaturstabilt under dæk. Hydrografisk laboratorium, 5 m^2.

Instrumenter:

	NOK
CTD sensor komplet incl. spil og kabel	350.000
Vandhenter	10.000
Ekko 600 ekkolod, komplet, 2 enh. a 600.000	1.200.000
Efterprocessing, grafisk EDB system	300.000
EDB netværk	300.000
Sonar SA950 (95 kHz) (alt. SM600 mod red. i pris)	1.500.000
Scanmar system	400.000
Trawl sonde	100.000
Diverse udstyr	500.000
Total udstyr:	**4.660.000**

Med venlig hilsen
CIC-MARINE

Torben Vindeløv

22 NOV. 198

KNUD E. HANSEN A/S

Skibstekniske Konsulenter

CONSULTING NAVAL ARCHITECTS · MARINE ENGINEERS

TELEFON: NATIONAL (01) 13 07 18
INTERNATIONAL + 45 1 13 07 18
TELEGRAMADRESSE: DESIGN
TELEX: 15841 DESIGN DK
TELEFAX: 132720

BREDGADE 75
DK-1260 KØBENHAVN K

18/11-1988
DERES (YOUR) REF.

VOR (OUR) REF.
88005
JMN/BC

CIC - MARINE
Consulting Engineers and Economists A/S
Ordrupvej 101
2920 Charlottenlund

Att.: Hr. Torben Vindeløv

Vedr.: Projekt for nyt forskningsskib

Med henvisning til Deres brev af 9/11-1988 har vi foretaget en beregning over byggepris for et skib med data og dimensioner som angivet i Deres brev.

Længde overalt ca. 54 m
Bredde ca. 12 m
Dybgang max. 5,0 m
Dødvægt ca. 1800 tons
Besætning: 27 personer i enkeltkabiner
Servicefart: 11,0 knob.

Ved indhentning af ca. 10 stk. tilbud på det internationale marked kan det forventes, at laveste pris fra et europæisk skibsværft vil være ca. 60 mill. NOK. Lægges hertil udstyrspakken for instrumenter angivet i Deres brev fås en samlet byggepris på ca. 65 mill NOK.

Vedr. driftsudgifter for et sådant skib, vil vi anslå, at disse vil være af samme størrelse som for nuværende R/V Fridjof Nansen.

At det nye skib er større end det nuværende, vil i denne situation opvejes af den forbedrede driftsøkonomi som vil være med et moderne maskineri. Det forudsættes her at begge skibe har samme dødvægt og samme servicefart.

../2

Vi håber ovenstående er tilfredsstillende, og står gerne til rådighed for sagens videre udvikling, herunder udførelse af projektet samt indhentning af tilbud fra diverse skibsværfter.

Med venlig hilsen
KNUD E. HANSEN A/S

Jens M. Nielsen

16 JAN. 1989

KNUD E. HANSEN A/S

Skibstekniske Konsulenter

CONSULTING NAVAL ARCHITECTS · MARINE ENGINEERS

TELEFON NATIONAL 01 13 07 18
INTERNATIONAL +45 1 13 07 18
TELEGRAMADRESSE: DESIGN
TELEX: 15841 DESIGN DK
TELEFAX: 01 13 27 20

BREDGADE 75
DK-1260 KØBENHAVN K

12-1-1989
DERES (YOUR) REF.

VOR (OUR) REF.
88172
JMN/EA

CIC-Marine
Consulting Engineers and Economists A/S
Ordrupvej 101
2920 Charlottenlund Att.: Hr. Torben Vindeløv

Vedr.: projekt for nyt forskningsskib

Der henvises til Deres brev dateret 20/12 88.

Vedrørende muligheden for at forsyne moderskibet med et "piggy back" skib, kan vi oplyse følgende:

1) En sådan løsning er teknisk mulig og vil kunne have sin fordel i visse situationer, f.eks. til undersøgelser på lavt vand.

2) Vi vedlægger en tegning af en 30 fod bådtype, som vi mener vil være egnet til formålet.

   Denne båd vejer 8 - 9 tons og kan løftes ombord på moderskibet. (54 m).

   Bådens service fart vil være ca. 8 knob ved installation af ca. 120 HK motor.

3) Moderskibets dimensioner som tidligere opgivet til ca. 54 x 12 m vil kunne fastholdes.

   Moderskibet vil overslagsmæssigt fuldt udrustet koste ca. 65 mil. NOK.

Piggy back skibet vil afhængig af fangst og undersøgelsesudstyr koste 1,5 - 1,7 mil. NOK incl. løftekran på moderskibet.

-/2

4) For bedømmelse af driftsomkostningerne for piggy back skibet, vil det være nødvendigt med fastlæggelse af, hvorledes arbejdsfordelingen bliver mellem piggy back og moderskibet. Det bør også overvejes, om der skal medtages ekstra mandskab for bemanding af piggy back skibet.

Med venlig hilsen
KNUD E. HANSEN A/S

Jens M. Nielsen

Bilag: 2 tegn.

ANNEX IV

Operational Costs (1982-88)

Operational Costs, R/V Dr. Fridtjof Nansen 1982-87

Figures in 1000 NOK	1982	1983	1984	1985	1986 Budget	1987	1988 Budget
Personnel costs:							
Crew Wages and Social Costs (8)	3,392	3,980	4,614	5,370	5,800	5,802	5,780
Crew Travel	556	711	774	1,015	1,070	1,183	1,320
Instrument pers. salary (1)	699	692	753	589	700	92 (9)	2,250
Instrument pers. travel	103	123	162	159	180	46 (9)	
Scientific pers. salary (2)	635	995	791	435	700	265	
Scientific pers. travel	194	346	310	327	360	212	
1987, salary paid directly by NORAD						550	
Total, Personnel	5,579	6,847	7,404	7,895	8,810	8,150	9,350
Operational Costs: (7)							
Instruments	133	259	948 (6)	848	600	544	850
Repair & Maintenance (3)	1,147	1,016	607	896	1,800	1,220	2,000
Fishing Gear	20	140	227	417	300	209	280
Fuel & Lubricants (4)	1,572	1,971	1,181	1,871	1,600	996	1,320
Provisions	181	331	319	354	400	399	755
Sundries	333	308	203	209	300	189	
Harbour Charges	330	356	613	451	600	799	850
Total, Operation	3,716	4,381	4,098	5,046	5,600	4,356	6,055
Total, Personnel & Operation	9,295	11,228	11,502	12,941	14,410	12,506	15,405
Overhead, 5% (5)	465	561	575	647	721	625	770
Grand Total	9,760	11,789	12,077	13,588	15,131	13,131	16,175
Grand Total in 1988 NOK	14,992	16,789	16,138	17,214	17,891	14,313	16,175

Average of annual costs (excluding budget figures 86,88):	15,889
To this shall be added:	
Allowance for planning, reporting and follow up work	2,000
(Estimated as 4 man-years annually)	
Allowance for printing and distribution of reports	30
Allowance for meetings seminars etc.	1,000
(Two planning and two regional seminars per year)	
ESTIMATED ANNUAL BUDGET	18,919

Notes:

(1) Two people

(2) Salaries paid during cruises only

(3) Extraordinary expenses, such as major repairs, etc, not included

(4) Fluctuations due mainly to changes in fuel prices

(5) Office and administrative costs

(6) Purchase of split beam equipment

(7) Operation 110 day/year

(8) Crew of 15 plus 2 trainees

Officers 1 months on cruise, 1 months off

Seamen 1 months on cruise, 1 months off

Deck hands 8 months on cruise

(9) Salaries for 3 scientists paid out of other NORAD funds

(General Cooperation Agreement)

ANNEX V

List of Persons Met

PERSONS MET

"R/V Dr. Fridtjof Nansen" Evaluation

Ministry of Development Cooperation, Oslo

Evaluation division:	Tore Rose
Fisheries division:	Kristin Lundby Kirsten Bjøru
Multilateral division:	Birgit Schjerven Jostein Leiro

Fiskeridirektoratets Havforskningsinstitutt, Bergen
Institute for Marine Research (IMR)

Odd Nakken, Director
Gunnar Sætesdal
Tore Strømme
Johan Blindheim, Oceanographer
H. P. Knudsen, Head of Instrumental Dept.
Gabriella Bianchi, Fisheries Taxonomist

Fiskeriteknologisk Forskningsinstitutt, Bergen
Institue for Fisheries Technology Research

Steinar Olsen

FAO, Fisheries Department, Rome

Wolfgang Krone, Director, Fishery Industries Division
John Fitzpatrick, Chief, Fisheries Technology Service
S. M. Garcia, Chief, Marine Resources Service
Armin Lindquist, Assistant Director General a.i.
N. Kojima, Director, Operational Services
Engeljan De Boer, Fleet Manager
P. Gonzales - Alberdi, Senior Officer (Trust Funds)
Per Sparre, Programme Officer
Siebren Vennema, Project Leader
Michael Sanders, South West Indian Ocean Project

Consultants from FAO report, 1987

A. M. Andersen (Edinburgh)
E. H. Nichols (Newcastle)

Nordisk Ministerråd, København
Nordic Council of Ministers, Copenhagen

Johan Williams

EEC - Directorate General for Development - DG VIII

Cornelia Nauen
Andreas Laggis

DANIDA

Jørgen G. Jensen, Fiskerkonsulent

SIDA

Lars Augustinsson

References:

1. Evaluation Report 4.82
2. Revised Final Report, May 1987
3. Recommendation S. No. 186
4. R/V Dr. Fridtjof Nansen Survey Reports
5. R/V Dr. Fridtjof Nansen Workshop Proceedings
6. Various Internal correspondence and documents

ANNEX VI

Terms of Reference

Ministry of Development
Cooperation,
Oslo, 01.08.88

Review of available evaluation and information material in order to reach a decision on the possible continuation of the work of the fishery survey vessel "Dr. Fridtjof Nansen" through the building of a replacement vessel.

TERMS OF REFERENCE

A. Background.

1. The fishery survey vessel "Dr. Fridtjof Nansen" has, since early 1975, undertaken fisheries surveys with the aim of providing developing countries with essential basic data on the abundance, distribution, and seasonality of their marine fish resources. The vessel's working life was foreseen as approximately 15 years, i.e. up to 1990, and it is therefore now neccessary to decide whether it should be replaced, or the programme terminated.

2. The vessel has operated under an agreement between NORAD and FAO, until 1986 with joint funding (FAO's share being provided by the UNDP), and in the last two years with the Ministry/NORAD meeting all the costs. Overall direction has been provided by FAO, and the vessel's day-to-day operations have been the responsibility of the Institute of Marine Research, Bergen. Within the Ministry of Development Cooperation NORAD has been substantively responsible for the project and has, since 1983, been involved in follow-up activities after each cruise; MULTI is responsible for the budgetary allocations to the programme.

3. If it were decided to build a replacement vessel and continue the programme, the construction and operating costs are assumed to be met in full by the Ministry. However, operations would require the cooperation and active participation of FAO as well as other relevant international and regional agencies, and the effective participation of the developing countries concerned.

4. An evaluation of the vessel's operations and related activities was carried out by NORAD in 1982, and the report published in 1983. This made a number of recommendations largely aimed at making survey operations, and results, more accessible and useful to the developing countries concerned.

5. Following a request by NORAD to FAO, FAO undertook a review of the project and an assessment of future needs for the type of work conducted by the "Dr. Fridtjof Nansen". This work was carried out in 1985-86, and the Revised Final Report issued in May 1987. It recommended the continuation of the programme, and the construction of a replacement vessel, to begin operations in 1990, with an expected lifetime of 15 years. (Realistically, a new vessel would not be ready until late 1991). Several background studies were undertaken on the need for further fisheries survey work, and a critical assessment made of experiences with the operations of the "Fridtjof Nansen". This led to detailed recommendations concerning work priorities and the manner of which future survey work should be structured and organized. The main focus of the future programme, it was suggested, should be the monitoring of developing countries' fish stocks, on-the-job training of these countries' fisheries officials through participation in surveys and interpretation, and a heavy emphasis on follow-up work after each cruise.

6. The construction of replacement vessel, and its operation for 15 years, would probably cost N.kr. 350 - 500 million at 1988 prices. The Ministry of Development Cooperation wishes to conduct an independent review of the existing ma-

terial and knowledge including, but not limited to, that discussed in 4. and 5. above. The review will assess whether additional evaluation work and/or information gathering needs to be done in order to have an adequate basis on which to make a decision on the continuation of the programme. Should further work be neccessary, this review would be cc sidered as Phase I of a two-stage evaluation exercise.

B. Work Programme.

1. The review will be undertaken by a Team consisting of two independent consultants and a Team Leader (the latter will not neccessarily be required full time):

   a) The Team Leader will be an experienced development economist, with some knowledge of the role of the fisheries sector in development and of Norwegian aid policies and priorities.

   b) One consultant will be a general fisheries expert with experience in working with fisheries administrations in developing countries.

   c) One consultant will be a specialist in fisheries surveys (technology, operations and interpretation).

2. The Team will review all relevant documentation and hold discussions with appropriate persons in Oslo, Rome and Bergen. Visits may also be made to the UK and to Tromsø in order to interview persons involved in the 1985-86 FAO assessment.

3. The consultants will prepare a written report, not to exceed 50 pages plus annexes, addressed to the Ministry of Development Cooperation, with analyses and assessments of the following:

a) The adequacy of information concerning unfilled survey needs (i.e. initial surveys), and ongoing needs (i.e follow-up monitoring surveys), in waters exploited by developing countries. Distinguish between coastal and deepwater surveys. Comment on the reasons for conducting surveys, and the extent to which these needs appear to be met in practice. Does the available information base, in their view, justify an internationally-sponsored programme for a further 15 years? If so, does the programme proposed in the FAO report, both in terms of technical content and geographical coverage, seem the most appropriate in meeting the needs of developing countries? (Discuss alternative ways of meeting developing countries` survey needs on a cost-effective basis, for example through a pool arrangement for research vessels, which would not neccessarily require that the "Fridtjof Nansen" be replaced). If the information base is inadequate for the above assessments to be reasonably made, what additional material is needed, and how could it be obtained?

b) The NORAD evaluation report in 1983 made a number of suggestions aimed at making survey operations, and results, more useful and accessible to the developing countries concerned. Do the programme's activities since then indicate that these suggestions have been adopted ? Have any other changes in the survey programme's structure and operations been made since then, inter alia to meet the criticisms contained in the 1983 report ? What have been the consequences of changes since 1983? Do the proposals concerning a future programme's structure and operational procedures made in the 1987 FAO report adequately meet the needs and interests of the developing countries so that they may derive maximum benefit from a future survey programme? If the available information on how to best structure a future programme in order to optimally serve developing countries' needs is inadequate, what additional material is needed, and how could it be obtained?

c) As a guide for further discussion in the Ministry :

- roughly estimate the likely order of magnitude of the costs of a new vessel and its operation,

- briefly outline the nature of the financial and other benefits to the developing countries of a future programme (distinguish between the benefits of alternative programme structures discussed in the preceding analysis),

- comment on the fit between such benefits to developing countries on the one hand, and Norwegian aid policies and priorities on the other (include, specifically, the priority Norway accords to helping the poorest population groups).

d) If a replacement vessel were to be built, its specifications will follow from the type of survey work it would be expected to perform. While recognising that responsibility for drawing up specifications lies elsewhwere, do the consultants' conclusions under a) and b) above suggest that enough is now known to begin work on the specifications of a new vessel, both technically and in terms of other functions such as in-service training? If not, what additional clarifications do the consultants feel are needed ?

e) Overall, and based on developing counties needs and Norwegian aid policies and priorities, is enough material available for a decision to be made on the continuation or termination of the survey programme? If not, and bearing in mind both the cost and utility of further work, and the time it will take, precisely what additional information is required, and/or what additional evaluation of previous survey activity needs to be undertaken?

4. The team of independent consultants is expected to undertake the review of documents and the field work over a period of four weeks, and to submit their report two weeks thereafter.

5. Any further work suggested by the consultants, to the extent accepted by the Ministry of Development Cooperation, shall be considered as Phase II of this excercise.

ANNEX VII

Logical Framework

LOGICAL FRAMEWORK

R/V Dr. Fridtjof Nansen
Fisheries Resource Evaluation and Utilization Assistance to Developing Countries.

PROJECT STRUCTURE	INDICATORS OF ACHIEVEMENT	HOW INDICATORS CAN BE ASSESSED	CRITICAL FACTORS.
WIDER OBJECTIVES To assist Developing Countries to develop and optimize their fishing industry through provision of essential data on their fish resources. Enable the Developing Countries to protect their marine environment and the artisanal fishery.	Appropriate investments in fisheries development, both private and public investments. Nation fishing at Maximum Sustainable Yield. Elaboration of Resource Management Plans.	National Statistics Catch Statistics	The recipient countries must be aware of the need for fisheries management and research. The relevant authorities and institutions must be able to receive/collect fisheries data and translate these into management and development plans. Is this understanding and capability not present, concurrent training and institution building projects must be undertaken in order to create an administrative environment conducive for fisheries development.
IMMEDIATE OBJECTIVES/PROJECT PURPOSE Provision of comprehensive information on living marine resources and their catchability.	Use of survey results in Fisheries Management Plans, Sector Development Plans and Industry Guidelines.	Existence of or adjustments to Fisheries Sector and Management Plans. Private sector investments in boats and fishing gear. Appropriate adoption of recommendations. Framework for licence agreements.	Assistance from other donors in the formulation of fisheries management plans and the subsequent enforcement of fisheries regulations. Investment in appropriate means of fisheries surveillance and control.
OUTPUTS Survey Reports which include: -Fish stock estimates: composition, abundance seasonality and species. -Estimates of MSY -Recommendations on degree of exploitation and expected catch rates per unit of effort. -Recommendations on choice of fishing techniques Seminars where survey reports are discussed in a sector development context. Training of research institution staff.		Review of publications and seminar attendance lists. (Survey reports, seminar reports and other publications.)	Timely permissions for surveys in national waters. Effective and timely planning of cruises by the FAO and IMR.
INPUTS -A marine research vessel fully equipped and staffed. -Programme planning and implementation (IMR). -Liaison with developing countries		Plans and reports	Commitment from other donor agencies to support concurrent and complementary programme in the countries concerned.

ANNEX VIII

FAO/DANIDA Training Project Part I & II 1982-92

FAO/DANIDA TRAINING PROJECT PART I 1982-88

During the period 1970-80 a series of Training Courses in methodology of Fishery Science (Biology) were held under the FAO/Government Cooperative Programme, made possible by special contribution from the Danish International Development Agency (DANIDA). The purpose of these courses was to train junior scientists in the basic concepts and techniques of fisheries biological sciences.

In 1982, a five-year project entitled "Training in Fish Stock Assessment (GCP/INT/392/DEN)" was funded by DANIDA for execution by FAO. The development objectives of this project were: (i) to improve the level of expertise in fish stock assessment in all countries with substantial marine and inland resources, and (ii) to develop methods for the assessment of tropical and other resources, and quick methods for preliminary assessments of newly exploited stocks.

The immediate objectives were:

(i) to establish a team of stock assessment experts in englishspeaking FAO member countries with important marine and/or inland resources;

(ii) to provide the means for training staff at intermediate level;

(iii) to rapidly disseminate newly-developed methods in developing countries, and to test these methods by exchange of information on their use in the field;

(iv) to establish contacts between stock assessment experts at high and medium level for exchange of ideas and data, and follow up of newly taught methods.

To achieve the objectives, the project was undertaking the following activities:

1. Preparation of lecture material adapted to the tropics.

2. Organization of two interregional, and five national courses on fish stock assessment in the tropics, and 3 follow up seminars.

3. Preparation of a manual on fish stock assessment in the tropics.

The Training Courses.

Two types of courses were held: (i) regional courses for participants from a number of countries within a region, and (ii) national courses to be held in countries with specific needs and sufficiently large fisheries research communities.

After having participated in a training course, participants are expected to be actively involved in the basic research work required in their respective countries; to provide data, assess stocks and fisheries, and to assist in proper utilization and management of their national fisheries. They are also expected to impart the new methods and techniques learned to their colleagues.

Follow-up.

All participants in the training courses automatically became members of the Network of Tropical Fishery Scientists, organized jointly by the project and the International centre for Living Aquatic Resources Management (ICLARM), Manila, Philippines.

Lecturing Material.

The lecturing material has been prepared by members of the staff of the Danish Institute for Fisheries and Marine Research and ICLARM. The material is based on investigations carried out in different tropical regions. It comprises an introduction to methods of fisheries science and six case studies. The choice of case studies, as well as the duration of the introduction to methodology, varies from one course to another. They are adapted to the importance of the subject in the region in question, and to the estimated level of the participants.

Preparation of Courses.

In order to ensure that the lecturers are familiar with the status of fisheries science, management and assessment problems, fishery research, fauna, etc., in the areas from which participants are recruited, preparatory missions are conducted prior to the courses. During these missions, the lecturers attempt to meet as many of the potential participants as possible, in order to adjust the lecturing to the needs and level of the participants.

Courses Held.

By the end of 1987, two regional and five national courses had been held. One regional course for the Northern and Western Indian Ocean was held in Mombasa, Kenya, in 1983 and one for West Africa and the Caribbean in Hirtshals, Denmark in 1984. The national courses were held in Cochin, India (1983), Penang, Malaysia (1984), Semarang, Indonesia (1984), Phuket, Thailand (1985), and Manila, Philippines (1986).

Seminars.

In order to ensure an efficient follow-up of the national and regional courses, it was decided to concentrate follow-up activities in three further training courses or seminars, to be arranged for selected participants from the previous courses.

Participants should bring their own material to the seminars for processing into a short publication to appear in the Proceedings.

Three such seminars were held in Hirtshals, Denmark (1986), Manila, Philippines (1987) and Cochin, India (1988). Proceedings from the two final seminars, containing 30 scientific articles, were published in 1988.

Manuals.

A stock assessment manual has been prepared and is being published in 1989.

FAO/DANIDA TRAINING PROJECT PART II 1988-92

The project was extended in 1988 for another five years period with the following objectives:

Development Objective.

Properly planned fishery research activities, and improved expertise in fish stock assessment in developing countries, as a basis for better management of marine and inland resources.

Immediate Objectives.

The project's immediate objectives will be to continue, consolidate and expand the various activities initiated during the project GCP/INT/392/DEN, and organize additional activities, which have been found necessary to achieve the development objective.

1. To train scientists in English, Spanish and Portuguese in fish stock assessment techniques. In particular in those methods which are applicable in tropical areas.

   (a) To establish a team of trained stock assessment experts in countries with important fish resources.

   (b) To disseminate new and old methods quickly in developing countries, and to assist in their application in the field.

   (c) To establish contacts between stock assessment experts on a global basis for exchange of ideas and data, and follow-up of newly taught methods.

2. To assist fishery research institutes in improving their efficiency through better organization and planning:

   (a) To set priorities in accordance with resource management problems.

   (b) To structure and organize the institutional set up accordingly.

   (c) To determine staff, equipment and training requirements.

   (d) To set up mechanisms for proper transfer of advice to fisheries administrations.

   (e) To establish relationships with sister institutes in other developing or developed countries for exchange of knowledge, staff and overall scientific cooperation.

   (f) To provide documentation which may serve as general and specific guidelines for (a)-(b).

Project Implementation.

Two courses on fish stock assessment and one seminar on research institute management were held in 1988. Two courses and one seminar are planned for 1989.