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MALMÖ, Sweden

THE DEVELOPMENT PLANNING OF FISHERIES
FOR MAURITANIA

by

BA Idrissa
Mauritania

WMU LIBRARY

A paper submitted to the Faculty of the World Maritime University in partial satisfaction of the requirements for the award of a

MASTER OF SCIENCE DEGREE

in

GENERAL MARITIME ADMINISTRATION

The contents of this paper reflect my personal views and are not necessarily endorsed by the UNIVERSITY.

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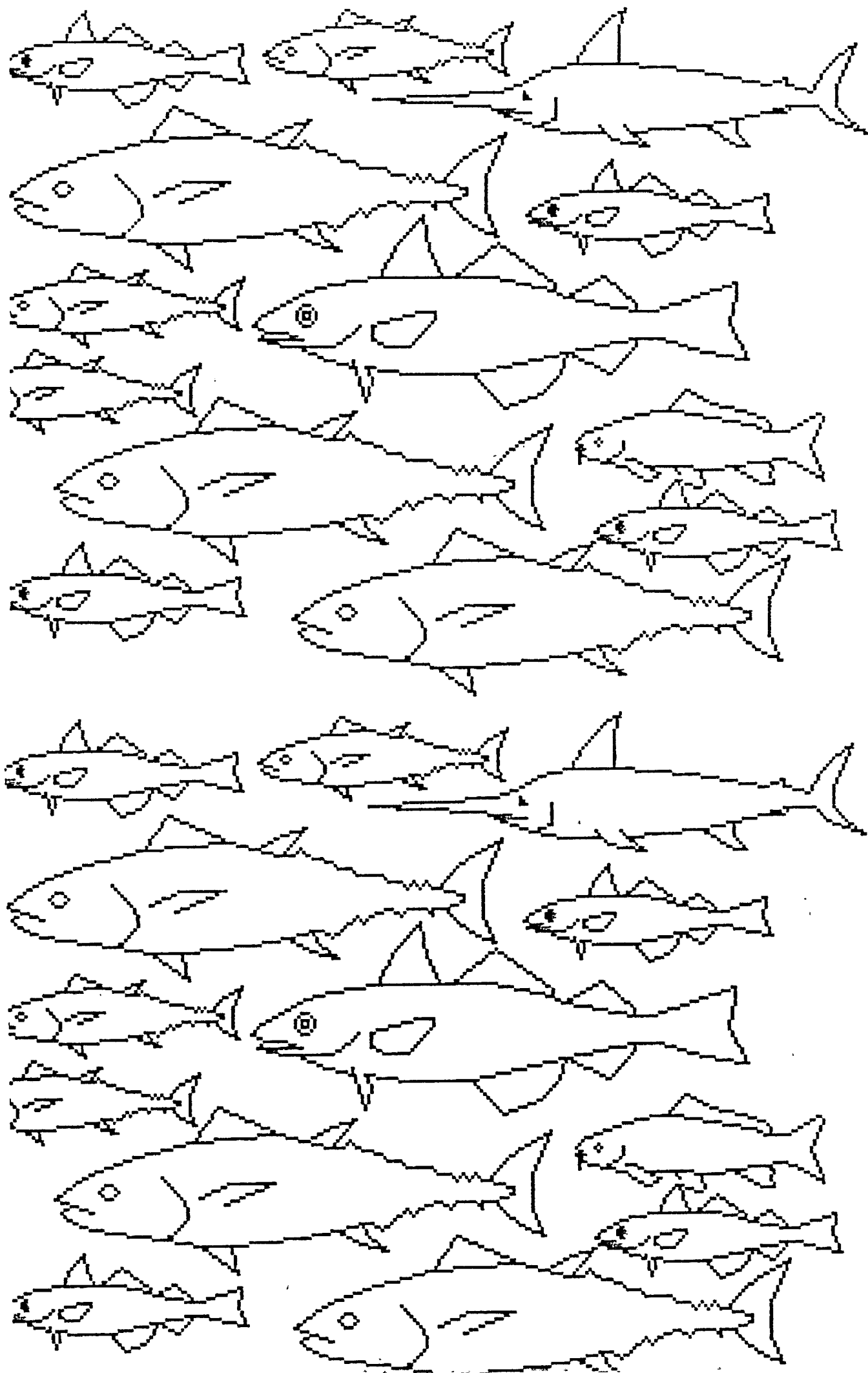
Supervised and assessed by:
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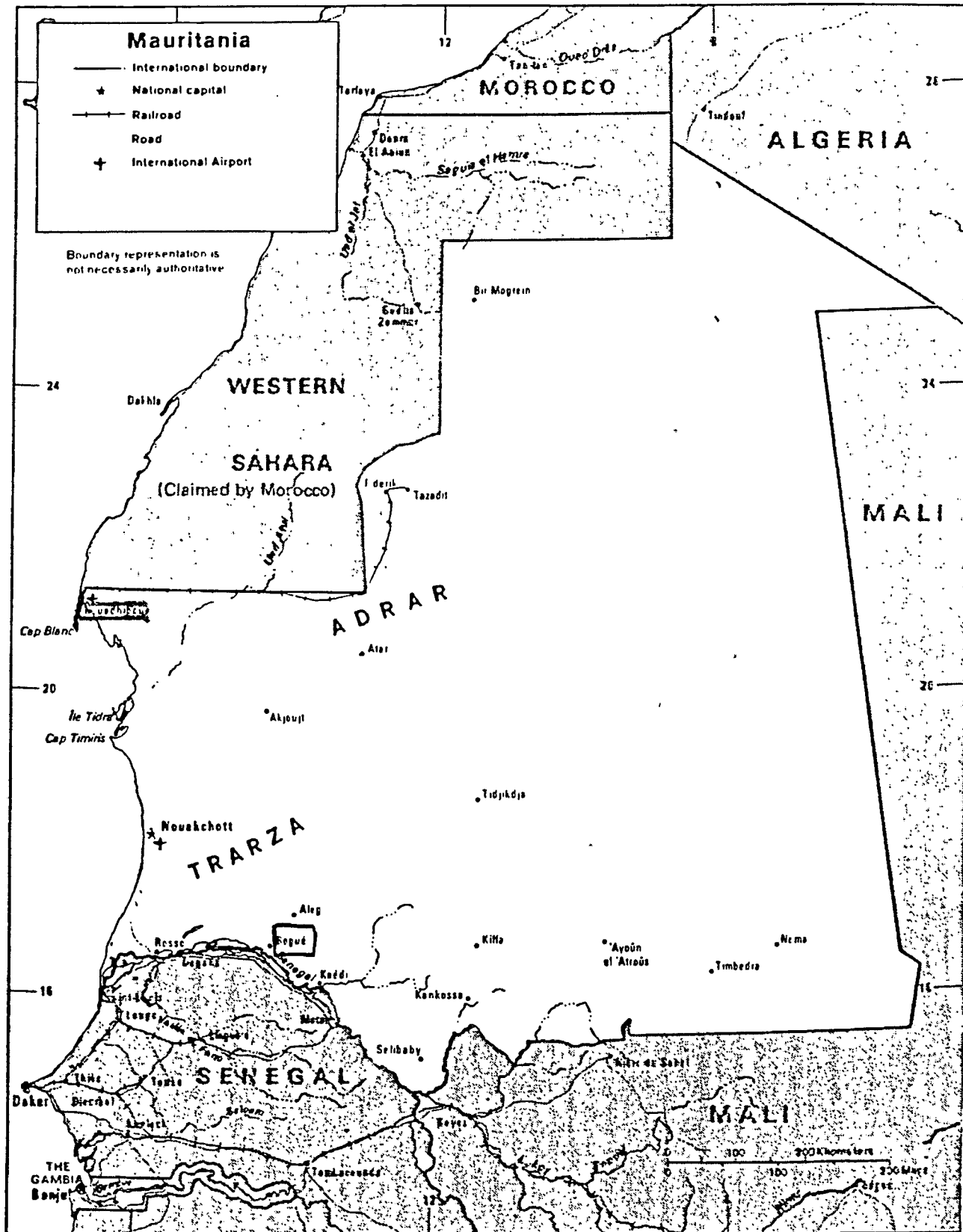
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DEDICATION

To my brother BA Amadou Abou for his support, my wife Aïssatou Ousmane N'Diaye and my children for their patience and encouragement while I was away from them.

MAURITANIA



- Town where author of the thesis works
- Home town

Fig. 1

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This thesis is written with the help and assistance of a number of scientists, economists and other specialists in the field of fisheries.

I would be remiss if I did not acknowledge at the outset the considerable and extremely able assistance which I received from Mr. Armin Lindquist, Assistant Director-General, Fisheries Department of the Food and Agriculture Organization (FAO) in Rome. Mr. Lindquist introduced me to scientists, economists and experienced persons in this field who were able to give me information about fisheries and advice on my subject. In this connection I must express my indebtedness to Messrs. B.F. Dada, S.M. Garcia and M. Goudet for their untiring help during my stay at FAO.

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PRESENTATION ON MAURITANIA

The population of Mauritania is about two million in an area of 1,030,700 square kilometres.

1 Geography

Mauritania is situated in north-west Africa and is bounded by Mali, Algeria, Senegal, the former Spanish Sahara and the Atlantic Ocean. The country has three distinct geographic regions:

- a narrow belt along the Senegal River valley in the south, where soil and climatic conditions permit settled agriculture;
- a broad, central east-west band characterized by vast sand plains and fixed dunes held in place by sparse grass and scrub trees; and
- a large northern arid region blending into the Sahara Desert, and characterized by shifting sand dunes, rock outcropping and rugged mountainous plateaus with elevations of more than 456 metres.

The Islamic Republic of Mauritania was proclaimed in November 1958 and shortly thereafter the process of transferring Mauritania's administrative services from Saint Louis, Senegal, to the new capital of Nouakchott, was begun.

Mauritania became independent in November 1960. In June 1961 it signed an agreement with France defining

post-independence relations with the former colonial power.

2 Economy

Mauritania has a dual economy with little interaction between the modern and traditional sectors of production.

The majority of Mauritania's inhabitants, either nomadic Arabs or settled farmers, live within a subsistence economy, supplementing their incomes occasionally by wage employment or by sale of produce on local markets. Most settled agriculture is confined to the north bank of the Senegal River, where millet, sorghum, rice and other cereals are the main crops. However almost all agricultural produce is consumed locally.

One of the most important natural resources of Mauritania is the large deposit of high-grade iron ore in the F'Derik area. The semi-autonomous development company, Société Nationale Industrielle et Minière (SNIM) exploits these deposits. The Mauritanian economy depends on the export of this high-grade ore, which traditionally has accounted for at least 70% of export earnings (before the international crisis of iron and the fishing boom starting in 1978 in Mauritania).

The major recent development in the iron ore industry was the decision by the Mauritanian Government to proceed

with the US\$500 million Guelbe project in Zoveyrat. Financing for the project has been promised by the World Bank, Japan and Arab and European development funds. The project will involve the exploitation of a new and larger, but lower grade, deposit about 30 kilometres from the existing but nearly exhausted iron ore site. About 5.4 million MT of this lower grade ore will be processed per year.

At the present time the fisheries is the most important economical sector in Mauritania. As you will see in the following pages, the waters off the Mauritanian coast are said to be some of the world's richest fisheries, and fish product exports are Mauritania's leading source of foreign revenue.

ABSTRACT

In preparing a paper on the assessment of the development planning and monitoring, control and surveillance of fisheries, my aim is not to overthrow the principles of the Mauritanian fishing policy, even less the management of the maritime sector. My aim is rather to emphasize the general needs of planning and to insist on the vital role of management as a whole.

It is well known that Mauritania is one of the richest countries in the world in fish stocks, because of the natural phenomenon called "upwelling"¹ in its territorial waters. Nevertheless, the profit arising from fisheries is slight compared to the evident potential and the important investments in this sector. In my personal point of view, one of the main reasons could be considered to be lack of planning and suitable management. Improvements achieved in planning and management would have a great impact in the interests of the fishing industry and therefore for the national economy as well.

Apart from the high biological complexity of the fisheries and the difficulty of monitoring, control and surveillance of the Exclusive Economic Zone (EEZ), the traditional management concept also needs refinement for socio-economic reasons. This paper describes the main constraints of development of industrial fisheries, as well as small-scale fisheries. Still,

¹ Upwelling = The process by which water rises from a lower to a higher level, usually as a result of divergence and offshore currents.

any long-term improvements in the fisheries sector will require some form of human intervention, to equitably allocate resources between different sections of the fisheries industry and in general limit the expansion of the fishing activities to prevent wastage of capital and human resources.

INTRODUCTION

As has been pointed out in the abstract of this paper, my aim is to emphasize the urgent need for planning of development of the fisheries sector in Mauritania and to insist on principles of monitoring, control and surveillance of the Mauritanian Exclusive Economic Zone (EEZ).

Indeed there are many problems involved in planning the development and expansion of a fishery as a whole, in particular for Mauritania which is not a maritime country and is faced with lack of capital, lack of available trained personnel and environmental difficulties. However there is a considerable change in that greater emphasis is being given to the real needs of management in the period since Independence in 1960. The motivation of the Mauritanian Government to increase the income from fisheries and to ensure the local consumption to meet protein needs is indeed clear, but without taking some measures, such as described in this paper, there is not evident hope in the short term, as well as in the longer period of time, of seeing these objectives realized.

In this paper I will present five chapters dealing with the objectives of planning, as well as monitoring, control and surveillance (MCS). I will describe the Mauritanian fisheries as an industrial complex, where

important and considerable investments are made, as well as the archaic situation still existing in the small-scale fisheries.

The process of determining the legislative and regulatory regimes which will best expedite development of the fisheries resource, while minimizing conflicts with neighbouring states and protecting our EEZ is complex, delicate and expensive. Even the most developed countries, with vast resources and experience in ocean management, are encountering severe problems in managing their areas of maritime jurisdiction. In chapter three and in the end of this paper I strongly emphasize the need for sub-regional coordination in MCS, as well as in the harmonization of legislation for better protection of the fish stocks, which ignore the political limits of different countries.

This paper examines also, in chapter four, the prospects for development of the maritime industry in Mauritania. The final chapter discusses strategy and recommendations by referring to the report of the FAO World Conference on Fisheries Management. Probably my recommendations are more theoretical than practical because again the lack of statistics and adequate structure of data on the fisheries of Mauritania make it difficult to provide a concrete working document. However this thesis recognizes in the development planning of the fisheries the aim to provide a framework which can be further developed by the Department of Fisheries.

I.

THEORY OF PLANNING AND
MONITORING-CONTROL-SURVEILLANCE

The view that planning of development is essentially desirable is hardly controversial. There are, however, major differences in the approach adopted by industrial nations, arising from fundamental differences in political philosophy. Extremes are represented by the centrally planned economies of Eastern Europe on the one hand, and those based on the principles of private enterprise and free trade, such as the United States, on the other. The developing countries are characterized by a wide range in political philosophy and hence, not surprisingly, by a considerable variation in their approach to national development planning.

Consistency in planning involves the ability to project the likely consequences of particular decisions, taken together or separately, not only upon the specific sector of the economy concerned (fisheries, being the subject of this paper), but also upon the socio-economic system as a whole. It is there that the choice and application of planning techniques is of importance.

The various forms of analysis available to the planner cannot in themselves provide a full understanding in even a simple socio-economic system. They can however, provide an understanding under simplified assumptions, of the relationship between selected variables and hence an indication of the probable outcome of a certain course of action. It

is, therefore, not a substitute for national judgement that planning techniques are of value, but as the tools which can improve the quality of such judgement by modern techniques and to reap the benefit of their efforts. Such a situation is explained by the fact that the net investment, although appearing as an item in the total net income, comes for the most part from abroad, and therefore remains concentrated in the hands of large enterprises which are only slightly connected with the economy of the country in which they operate. Economic and social development has now become an inescapable requirement for all countries and people in the developing countries, particularly in the Sahel countries including Mauritania.

There are many constraints (economic, social and historical) which prevent these countries from breaking the vicious circles which bar the way to progress and development. These constraints usually constitute interdependence, the removal of which, however, does not necessarily trigger off a regular and sustained process of growth. On the contrary, the problem is to identify in the development process those positive forces able to counterbalance the existing obstacles. Development may therefore be said to consist not of concentrating on the scarcity of resources, but rather of identifying those mechanisms which mobilize and/or under-utilized factors. This is the role of planning, which has become during the

last fifteen years, the means to their development. The need to plan is no longer questionable and planning is now almost universal. Planning must be a continuous process which requires the participation at various levels of all the nation's productive forces. Its basic aim is to coordinate the production effort and to raise its level.

In connection with planning of development, there is the need to provide for effective monitoring, control and surveillance, which is most important in fisheries management. In 1978 many countries in the world extended their Exclusive Economic Zone to 200 miles. The extension of national jurisdiction provided, for many coastal states, increased opportunities and responsibilities in respect of monitoring, control and surveillance. These opportunities and responsibilities relate to fishery resources; mineral resources (both sedimentary and superficial); disposal of wastes; protection of the marine environment; customs and quarantine activities; the use of the physical characteristics of the ocean as a source to generate energy; search and rescue services, and other. Both the kind and level of investment by a state in monitoring, control and surveillance depend upon the importance to that state of its various opportunities and responsibilities. It is necessary, therefore, for coastal states to evaluate the relative importance of these opportunities and responsibilities.

With regard to fisheries, the evaluation will depend upon the objectives sought from the use of the resources. The overall objective can be stated as maximizing net benefits, while protecting the resources. But this objective needs more specification in order to be useful as a guide for decisions on the kinds and levels of investments in monitoring, control and surveillance. Many different kinds of benefits may be sought, and some of them may be incompatible with each other.

Some of the benefits sought by states relate to:

- a) opportunities for employment;
- b) earnings for fishermen;
- c) processing and marketing of fish products;
- d) supplies of low cost protein;
- e) export earnings;
- f) extraction of revenues from foreigners.

Other benefits might also be identified. It is clear, however, that not all of these can be maximized simultaneously. Thus, decisions will have to be made on the relative importance of the different benefits and the degree to which one may be traded off against another.

Throughout this paper it is not the intention to go deeply into the conception of monitoring, control and surveillance, but only to make proposals which can be implemented in Mauritania.

II BRIEF REVIEW OF BASIC CONCEPTS OF
FISHERIES MANAGEMENT

Fisheries management is the pursuit of certain objectives through the direct or indirect control of effective fishery efforts, or some of its components. Fisheries development, on the other hand, is the expansion of effective effort through a set of assistance programmes, again for the purpose of attaining certain objectives. More broadly, we can include, in addition to the expansion of the fishing effort, improvement in post-harvest technology, marketing and transportation of fishery products, as well as the provision of infrastructure and other related facilities.

Because of its "control" feature, fisheries management is thought to be required once a fishery area becomes "over-exploited", while fishery development is thought to apply while a fishery is still "under-exploited".¹ This need not be so. One need not wait for over-fishing to occur before management measures are taken. Over-fishing is better avoided by judicious management measures taken along with development. Similarly, the need for development is not confined to under-exploited fisheries. As management of over-exploited fisheries sooner or later involves the regulation of the fishing effort, development, fishery-related or otherwise, is needed to absorb the surplus labour and capital. The development of planning cannot be separated from enforcement of management regulations and development of sufficiently attractive employment alternatives. Moreover,

further "development" of an already "over-exploited" fishery may not be as unwarranted as it sounds if the proposal is a temporary solution of otherwise intractable social problems.

These interrelations notwithstanding, the priority in over-exploited fisheries is for management and in under-exploited fisheries for development. Thus, the general objective of both management and development in the attainment of the "optimum" rate of exploitation of the fishery. How this optimum is defined depends, of course, on the specific objectives of the policymakers.¹ If the policy objective is maximum fish production then the optimum rate of exploitation is defined by the maximum sustainable yield (MSY), that is, the maximum catch that can be obtained on a sustained basis. If the actual catch is less than MSY because of insufficient fishing effort, the fishery is said to be "biologically" under-exploited and further development is possible, while if the catch is lower than MSY because of excess effort the fishery is "biologically" over-exploited and management is called for. Thus it is not sufficient to know the MSY and to compare it with the actual catch; we need also to know the fishing effort required to obtain MSY and to compare it with actual effort.

If, on the other hand, the policy objective is to maximize the economic benefit to the national economy from the fishery, the optimum rate of exploitation is defined

¹ Refer to Glossary, regarding MSY.

by the maximum economic yield (MEY), that is, the maximum sustainable surplus of revenues over fishing cost.

Alternatively MEY may be thought of as a modification of MSY to take into account the value of the fish caught and the cost of catching it. The fishery is said to be under-exploited in the economic sense and to require further development if the actual catch falls short of MEY due to insufficient effort. Analogously, the fishery is said to be over-exploited in the economic sense and to call for management if the actual catch falls short of MEY due to excess fishing effort.

A Open access and easy entry

Until very recently, world fisheries had been open-access resources in the sense that whoever wanted to take up fishing was free to do so. Under the new ocean regime, open-access within a country's EEZ is limited to the nationals of the country concerned. People are attracted into fishing by the prospect of earning an income higher than in other economic activities with more or less the same amount of effort. How is this possible

If the alternative to fishing is farming, one needs to purchase or rent the natural resource (fishing ground and fish), hence, unlike the farmer, he need not pay rent to any "sealord"; he can keep it for himself, thus "appropriating" in a way the resources and making himself

a sort of seahord. However, unlike the landlord, he cannot exclude others from appropriating the very same resource: even if he could prevent others from operating in the same fishing ground, he still can do little to prevent the fish from moving between and being exploited in other grounds. Hence, early entrants into a virgin fishery can reap substantial benefits until others, attracted by the shares that most fishermen earn no more than if they took up farming (or whatever other alternatives were available to them) in the first place.

A few fishermen may still earn some profit due to above-average ability or more sophisticated technology, but these are not resource rents but rents of ability or quasi-rents arising from the prompt adoption of new technology. Any fishermen who incur losses, by definition, could earn a better income outside the fisheries and as soon as they can find a good buyer for their boat and gear, and a new job for themselves, they would be out of fisheries.

In the long run, and under static conditions, it would be difficult to find fishermen earning either more or less than they can earn from other occupations; there would be no reason for those already in the fishery to leave or for those outside the fishery to enter. What is wrong in this "happy" state of affairs? Is everybody receiving as much as he is entitled to under the system? Yet, something is lost.

If the fishermen earn no more than they could earn elsewhere, if the Government earns only a small amount of tax revenues from the fisheries, and if the society at large gets no special benefits from the fishery, then what is the advantage of having a marine fishery?

The landed fishing catch fluctuates from year to year, as can be seen in Fig. 2. The reason is either the ignorance of the real fishing effort which gives the largest possible difference between the value of output and the cost of effort inputs or the limitation of global DWT allowed to fish with serious control of catch. The actions of the individual fishermen in attempting to minimize their own income do not result in the maximization of the society's economic yield but to its complete dissipation. As long as there is any excess of revenues over costs (positive economic yield), existing fishermen would increase their effort and new fishermen would enter until costs have risen substantially and the resource has been reduced (or its composition changed) by so much that the net economic yield from the fishery is zero, revenues just covering cost. (Ref. Fig. 3.)

The figures would appear to predict that at least in the long-term there would be no fishermen who would make a profit, because of the increase of new-entry fishermen.

TOTAL FISH CATCH
(metric tons)

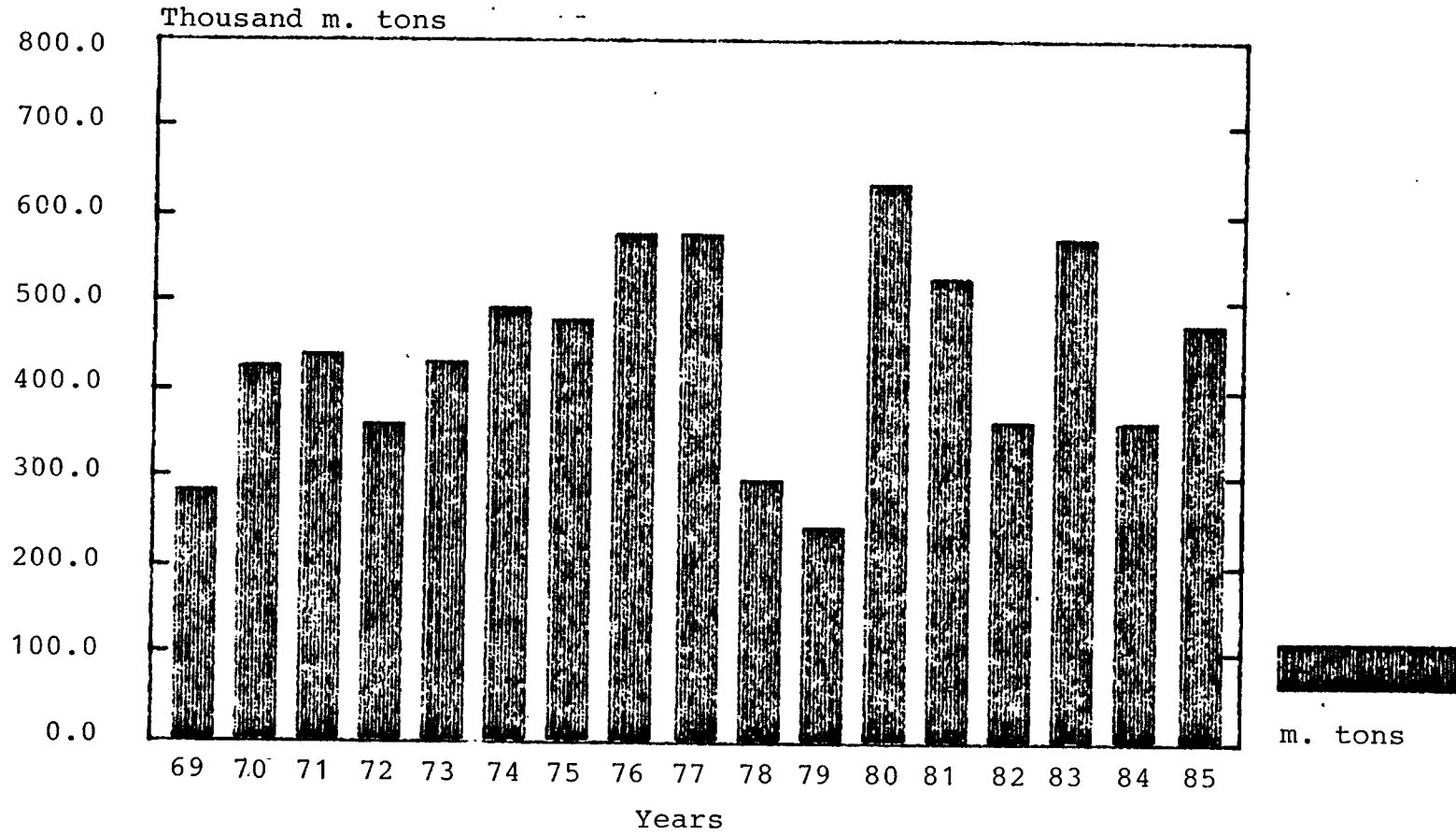


Fig. 2

Sources: Port of Nouadhibou .
National Budget Office
BCM

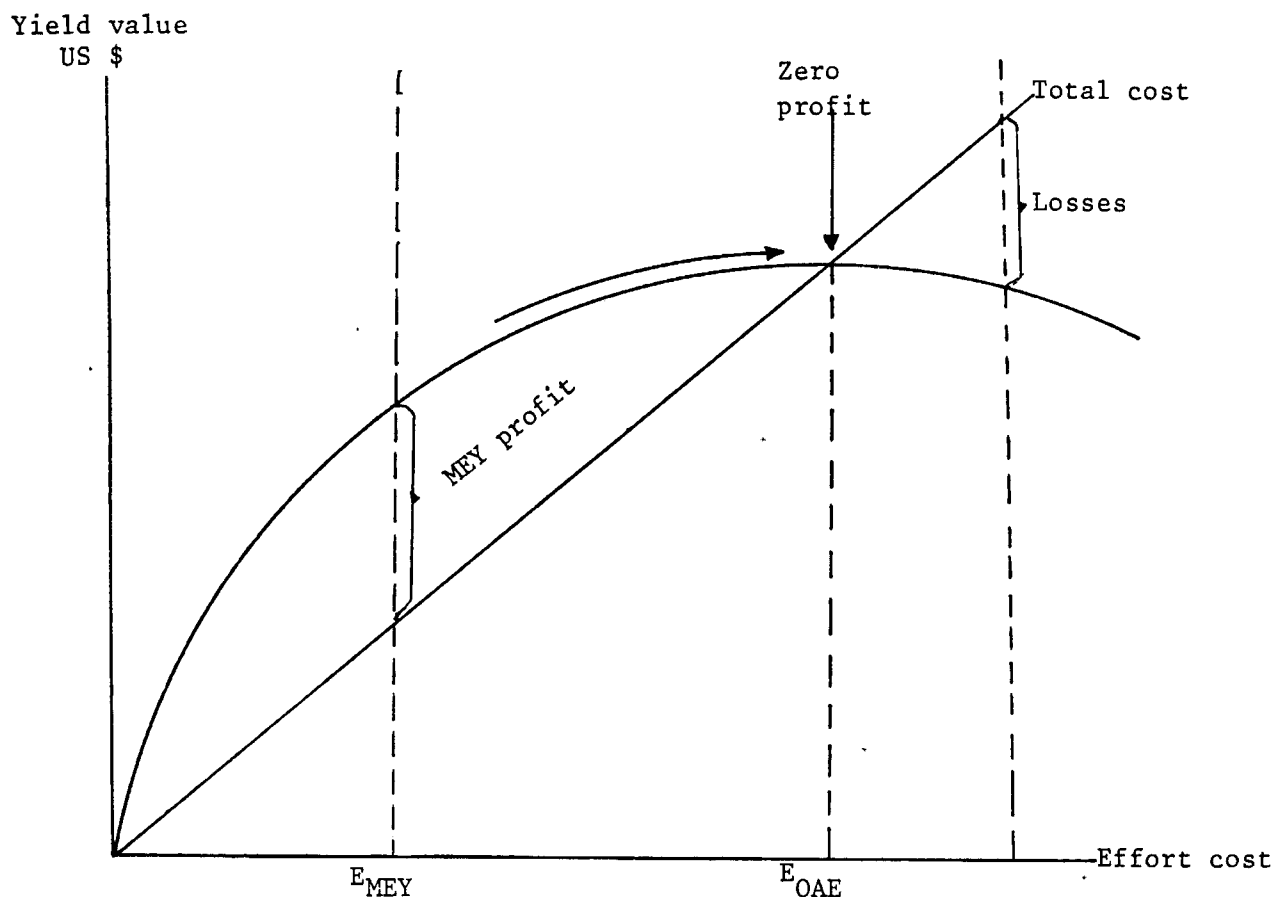


Figure 3: The maximum economic yield (MEY) cannot prevail as a long-term equilibrium in an open access fishery. As long as there are (excess) profits to be made, new entrants would be attracted and effort would expand with a zero profit or open-access equilibrium (OAE) is reached at E_{AAE} level of effort. (see Glossary)

From the above analysis, two policy implications may be derived:

- a) an open-access fishery makes little or no long-term contribution to the country's economic development since any economic surplus created is self-destructive through the additional entry it attracts.
- b) favourable changes in economic conditions or attempts to further develop the fishery or assist the fishermen results in further entry and hence a further depletion of resources or adverse changes in its composition.

B Biological aspect

While fisheries biology is a science in itself, the fisheries administrator needs only to be familiar with some basic biological concepts and relationships of direct relevance to fisheries development and management. In the simplest case of a single species, the relevant relationship is the one between "sustainable catch" and "fishing effort". Sustainable catch is the quantity of fish in terms of weight of biomass which can theoretically be caught year after year without a change in the intensity of fish stock. Fishery managers are interested in the suitable catch rather than any temporary changes in the catch because fish, being a renewable resource, is capable of being harvested on a suitable yield basis. Fishing effort, on the other hand, is a composite index of all inputs employed for the purpose of realizing this catch. Fishing effort is understood in effective rather than nominal terms, that is, in terms of its effect on the fish stock.

The relationship between sustainable catch and effort is a basic production relationship relating output (catch) to inputs (effort) but, unlike other production relationships, there is no direct relationship between output and fishing effort. This is due to the fact that fishing effort, while

the only input supplied by man, is in fact combined with a natural resource, the fish stock, to "produce" catch. Were the fish stock a fixed factor, just like land, output can be expected to continue increasing (though at a decreasing rate) in response to increases in effort, except at the extreme point of overcrowding when output might actually decline. However, the fish stock being a living resource, rather than a fixed factor, reacts to changes in fishing effort in a manner which complicates the catch/effort relationship. Hence, to understand this relationship, some basic biological features of the resource need to be considered.

A basic biological concept is the "net natural growth" of the fish stock which is the net increase in the biomass of the fish population between two points in time. Net natural growth is equal to recruitment plus individual growth of fish already in the stock, minus natural mortality. The growth of the stock is an important concept because it is the amount of fish which can be caught on a sustainable basis without affecting the size of the stock. Hence, it is important to know what determines the growth rate of a given fish stock.

One theory, known as the Schaefer Growth Model, postulates that the growth of a stock of fish depends on the size of the stock. At a small stock size the growth is small, but it

increases as the stock becomes larger until a point of maximum growth is reached beyond which growth declines with further increases in the stock due to limits placed by environmental factors (food, space, etc.). Fishing effort enters the model as a form of fishing mortality in addition to natural mortality. The larger the fishing effort, the higher the fishing mortality and the lower the (equilibrium) size of the stock. That is, there is an inverse or negative relationship between fishing effort and the size of the standing stock.

The fishery administrator needs to keep the equilibrium of relationship between fishing effort and the growth of a stock, because it proves that the long-term response of catch to changes in fishing effort, which is the main variable under his/her control. In the early stages of exploitation of a fishery, expansion of effort brings about more or less proportional increases in catch; but the more effort expands the smaller the growth in catches until a stage, known as maximum sustained yield (MSY) is reached, beyond which additional effort reduces, rather than raises, the sustainable catch. This is not to imply that it is not possible to temporarily catch more fish by increasing effort beyond the level corresponding to MSY; however, such an increase in effort leads to a smaller and smaller increase in catch and cannot be sustained over the long-run, at least not by the fishery as a whole. A temporary increase in catch following

an expansion in fishing effort should not mislead the fisheries administrator into believing that there is still potential for further intensification of fishing, only when the increase in catch is shown to be sustainable over time there being further scope for expansion. Yet it should be noted that even in an under-exploited fishery, as fishing is intensified, additional effort brings forth smaller and smaller increases in catch as MSY is approached. The diminishing efficiency of effort as exploitation increases can be seen clearly by expressing catch per unit of effort as a function of effort.

To sum up, a fishery administrator may achieve the maximum possible catch from a fishery on a sustainable basis by simultaneously adjusting the level of fishing effort which corresponds to the highest point on the chosen sustainable yield curve and the age at first capture, which puts the fishery on the highest possible sustainable yield curve.

It must also be kept in mind that after a change in either the level of fishing effort or in the age at first capture, sufficient time (depending on the lifespan of a species concerned) must be allowed for the age structure of the stock to stabilize at the new conditions of exploitation.

III DESCRIPTION OF MAURITANIAN FISHERIES

The Saharian sea water has for a long time been known by fishermen all over the world as richly populated by all species of fish. The Portuguese fishermen were the first visitors to this sea, fishing from Cap Bajodor to Rio de Oro and on to the Bight of Argain, in Mauritania.

During the fifteenth century, the Flemish, Basque, Andulucian, English, French and Italian fishermen came to this El Dorado sea. The Italian navigator Cadamosto wrote in 1454 a famous book about the Saharian waters, in which he said: "There is all species of delicious fish". For all this natural sea wealth, the Mauritanian Government did not attach great importance to the sea as a source of development.

In 1978 Mauritania established both a 70 mile territorial sea and a 200 mile Exclusive Economic Zone (EEZ). The Atlantic waters off its coastline, enriched by upwelling, are estimated by FAO to have a potential annual yield of 600,000 MT of fish, of which about 450,000 MT would be pelagic, mostly sardinella, horse mackerel and mackerel. The demarsal fish potential is around 100,000 MT annually and cephalopods have a potential of around 40,000 MT.¹

Artisanal fishermen using paddles, sails, motorized canoes and man-powered breach-seine fish in the Mauritanian waters. In addition to the artisanal fishing activities

¹ The FAO statistics are updated on page 43.

Mauritania has small purse-seiners and some trawlers operating from Nouadhibou, the only deep-water harbour in the country. However the bulk of the catch in Mauritania was taken by foreign vessels under Mauritanian licence, or by joint venture craft.

After the increase of the desert in the north of the country, the serious drought due to lack of rain, the crisis caused by the shortage of iron (which was the main resource of the country) and the decrease of Mauritanian livestock, the prospects for the economy became very doubtful. The unique and suitable alternative was the management of fisheries as a source of development, providing foreign currency income as well as domestic consumption.

A. Industrial fisheries

In recent years it has increasingly been felt that inadequate attention has been given to improving the methodology and data base required to satisfactorily assess and implement fisheries development in Mauritania. This lack of methodology and paucity of a data base is particularly acute in regard to the field of fishery planning which depends to a large degree on consistent and adequate information of an economic nature. In Mauritania, the problem of fisheries deserves special attention, in view of the revenue to be derived from it. Nevertheless there

is a lack of a suitable approach to planning and management which are a fundamental basis for increasing revenue from this wonderful resource. On the one hand the majority of fishing grounds are intensively fished by foreign-based fleets and on the other hand by substantial fishing activity being practised on the same stock by the very old national fleet and artisanal canoes.

One of the objectives of the new fishing policy is to promote the national fleet and to improve catches and opportunities for national fishermen. However, the present situation, described in Table 4 shows that foreign fleets are highly active in the national waters.

Even though there is permanently the need to earn foreign currency through the sale of licences, it is not advisable to look only in the short term, but to promote and encourage the acquisition of new fishing vessels by governmental help and national banking assistance. Nevertheless the age of the second-hand vessels and their technical performance should be viewed very carefully in order to avoid very old vessels which can become more problematic than efficient.

Reducing the foreign fishing fleet can have a beneficial effect in several ways, but whether the benefits

will be realized and whether they will exceed the costs depends on whether Mauritania has a fishing fleet of sufficient size to provide the economy with enough revenue. Whether or not a reduction in foreign fleet fishing improves the national fisheries, it may be very useful in avoiding licenced vessels and to encourage chartered vessels managed by national companies or private Mauritanian fishermen who must procure their capacity and have a good programme of investment. If the Government is obliged to provide licences for economic reasons, they should be issued on the basis of quotas but never again in the future based on a period of time where the State will lose because of the light capacity for control. The main disadvantages of commercial licencing are a corollary of low-risk, low-cost, high flexibility advantages.

Even where development provisions are a condition of licensing, unsubstantial nature of the arrangement counsels against great expectations. Another disadvantage of commercial licensing is the possible failure to receive the advantages: the fisherman may cheat, may not pay, and may not report their catches accurately. The costs of controlling this tendency may significantly reduce the net benefits expected from this operation.

Whether it is apparent or not, there is overfishing in Mauritania because of the illegal fishing vessels operating in the Mauritanian waters. The best way to

operating in the Mauritanian waters. The best way to promote high revenue and low risk is to promote the national fleet and joint venture arrangement. However great care must be taken when it comes to setting up those agreements in order to protect Mauritanian interests and the Government lawyers and economists have an important role to play in the period of negotiation of these agreements.

B Fishing regulations and agreements

Before implementation of the new fishing policy (1978) Mauritania had a system of allowing vessels to fish in certain designated areas, on payment of varying licensing fees. Within the Bay of Levrier and along the shore of Arguin Bay only artisanal vessels can fish. In the central area of the outside of Arguin Bay, the small ice trawlers based in Nouadhibou are permitted to fish. Outside of a base line extending from Nouadhibou to Cap Timiris for twelve miles, the vessels landing at Nouadhibou are considered to be paying US\$15 per GT licence fee, and those vessels not landing at Nouadhibou are considered to be required to pay US\$200 per GT. No trawler is allowed to use a stretch mesh size in the cod end of trawl nets of less than 60 mm.

In 1977 the Mauritanian Government gave licences to 236 vessels (of 123,811 GT) to fish in the national waters at a cost of US\$6,859,224. This compares with 1976, when a total of 206 permits were issued at a cost of US\$5,900,000 for a total of 106,872 GT.

According to these data (taken from Marchés Tropicaux et méditerranéens, 1976 - 23 December 1977) the average licence fee per gross ton was:

$$\frac{\text{Two years' total fees paid}}{\text{Two years for total GT}} = \frac{6,859,224 + 5,900,000 \text{ US\$}}{23,811 + 106,872} = \frac{12,759,224 \text{ US\$}}{230,683}$$

= US\$ 55.3

The agreements signed between Mauritania and certain foreign governments have concerned the number and size of foreign-based vessels which are permitted to fish in local waters. The disadvantages of this form of licensing is that the species composition of the catch and the quantity of each species caught is disregarded, and this does not necessarily permit optimal management of the various stocks. Therefore it can be recommended that future agreements specify the actual weight of each species which it will be permitted to fish, through a quota system by a specific number and type of vessels. The annual quota for each species would have to be determined by the local research centre (Centre de Recherche océanographique et des pêches).

Through agreements it might be advisable to allow fleets based at Nouadhibou to follow the fish stock as it migrates along the coast from one country's jurisdiction to another. This would limit the strong seasonal changes to which fleets are subjected when based at only one port,

and would encourage a regional approach to the management of resources. This sort of agreement would have to be covered by the payment of satisfactory licensing fees related to returns on investment or the signing of reciprocal arrangements.

An alternative licensing scheme could include the payment of an annual fee based on gross tonnage of fishing vessels, in addition to an extra payment dependent on the length of time permitted to fish in certain zones.

C The new fishing policy

In 1978 there was an abrupt change in Government policy in Mauritania, away from the straight issue of licences to foreign flag vessels to fish Mauritanian waters. By mid-1979 the Soviet and Japanese ice trawlers, numbering about 55 in total, had ceased to land in Nouadhibou. This led to a reduction of the onshore installations of COMACOPE, SOFRIMA, MAFCO and IMAPEC*. The Japanese freezers, landing in Las Palmas, left the Mauritanian waters; so also did the Spanish freezers, as the Spanish/Mauritanian fishing agreement terminated in early 1980. IMAPEC closed down in mid-1980 when the Spanish managers left the country. However the installations were taken over by the Mauritanian/Libyan joint venture SALIMAUREN in late 1981; the

installations were completely refurbished ready for reopening in mid-1984. MAFCO worked from March 1981 to March 1982 when the Japanese fleet restarted operations. Since that date, when the Japanese finally ceased working in Mauritanian waters, there has been a take-over of interests by the Mauritanian/Iraqi joint venture SAMIP. The Mauritanian company SOFRIMA has continued to operate but at varied intensity. COMACOPE, a Mauritanian company with Portuguese shareholdings, continued to process fish into meal, but the operations ceased in July 1982 and the Portuguese vessels stopped fishing.

Companies which have built cold stores at Nouadhibou since 1981 include MSP, with Scandinavian fishing company joint venture trawlers (JTL) as a partner; SIMAR, a State cold store (with Romanian interests); and COMACOPE which is financed by a Mauritanian businessman. The cold storage capacity now exceeds 20,000 tons. The cold stores also have freezer units attached, which have been under-utilized as much of the product now landed has already been frozen at sea. Further cold stores are soon to be commissioned by SALIMAUREN, MAUSOV and ALMAP.

In March 1980 an agreement was signed with the Soviet Union to establish a joint venture called MAUSOV, and Soviet fishing vessels restarted fishing for MAUSOV for three months in mid-1981. Operations restarted again in

October 1981. Until December 1983, when operations were suspended until the end of April 1984, the company had chartered about 24 vessels of Soviet origin. Ten were BMRT with 88 crew members, four were BRTM with 29 crew members, and were used for cephalopod trawling. All pelagic fish is reportedly sold to SOVRYFLOT (who sell 15 percent to the company FRANSOV), and the fish and cephalopods are sold to the Japanese trading company TAIYO. In 1983 the company's Soviet-flag vessels are believed to have caught about 160,000 tons. Future plans include the construction of a cold store, and purchase of vessels.

Under a Government Protocol of 25 February 1980, signed at Nouakchott, the joint venture MAURITANO-INTERPECHE was permitted to continue fishing and transshipping until 31 February 1982. It was understood that the joint venture would establish a shore freezing facility of 25 tons per day, a fish meal plant and cold store. INTERPECHE in fact ceased operations at the end of 1981 when the vessel Interpêche I was taken to Chile, where the propeller was removed and the vessel used as a barge.

The joint venture between Algeria and Mauritania called ALMAP functions in cooperation with a sister fishing company which provided four freezer trawlers. These trawlers now form the basis of the fleet. Twelve ice trawlers of 20 metres length are being built in France. Further

cephalopod freezer trawlers have been temporarily chartered, with a crew of 11 Mauritians, 5 Spaniards and one Korean, for sorting and classification of the catch.

SIGP continues to dry small amounts of fish. For the last part of 1982 the company obtained licences for Soviet vessels to fish small pelagics for selling to UK interests, and onward selling to Nigeria.

A company called SPA has been reported as working with Bulgarian pelagic trawlers. SOMATIG works with Spanish cephalopod trawlers. SMAIP worked with Portuguese vessels; this national company is one of the most efficient in the liberal Mauritanian shipowning business.

Joint ventures with Korean interests include SOMACOPP and PARIMCO. COMAR organized the licences for pelagic trawlers of the Nigerian national fishing company to operate in Mauritanian waters in 1981/82, prior to the cessation of activities. COMAR now licences Spanish Canary Island purse seiners to operate intermittently for transshipment to freezer vessels.

A number of Mauritanian companies arrange for licences of foreign vessels to fish in the national waters. These include COOPCADIZ which assists Huelva-based hake/shrimp boats to operate, in association with the company SARIM.

SOTRAMER assists Soviet vessels to obtain licences. The most substantial Mauritanian owner has cephalopod freezer trawlers operating with the companies MAHANOUA, MAGASA and MAHAPU.

On 15 November 1982, the Mauritanian Government decreed that henceforth all cephalopod vessels fishing in Mauritanian waters should land marine products at Nouadhibou, rather than Las Palmas. This has considerably increased revenue to the Port Authority of Nouadhibou and has permitted better control by Governmental authorities of catches.

Fishing concerns in Mauritania are affected by the high value of the Ougouya and the fishermen's salaries which (at about 16-30,000 UM) are generally three times higher than those in Mauritania's neighbouring countries. There is also a problem in maintaining adequate supplies of spare parts at Nouadhibou; electricity costs are relatively high; and there is no fuel subsidy, fuel being purchased locally at a cost of US\$372 per ton in 1983 (compared to a cost of US\$338 in Las Palmas).

The FOB value of frozen pelagics is normally assessed at US\$315 per ton, and the FOB value of frozen demersal fish and cephalopods is normally assessed at US\$1,500 per ton. The export tax on demersal fish and cephalopods caught by chartered vessels is 17.5%, and when caught by

Mauritanian vessels the export tax is 10%. All demersal fish and cephalopods frozen ashore are subject to a 7.5% tax. Frozen small pelagics are taxed at 11% of the value (because they are normally caught by foreign flag vessels and frozen at sea). Frozen small pelagics are transshipped in the Bay of Nouadhibou.

The fee for a licence can vary from about US\$1,000 per GT for a vessel catching high value species. A chartered vessel, or a Mauritanian-registered vessel, pays no licence fee. For chartering small pelagic vessels the Mauritanian partner is reported to earn 27% of the catch value and then pays the Mauritanian crew, port dues, etc., as well as export taxes.

For chartered demersal trawlers, the Mauritanian partner is reported to earn 31% of the catch value. The foreign vessel owner pays for gasoil, foreign crew, etc.

At the start of 1984, the demersal trawler fleet consisted of twelve chartered ice boats, thirty-one chartered freezers, thirty national flag ice boats and forty national flag freezers; it also had fifty-six pelagic vessels. It was provisionally reported that the export taxes and licence fees received by the Government amounted to approximately US\$28 million in 1983, on exports of about 350,000 tons of small pelagics and 20,000 to 30,000 tons of cephalopods (although much of

the catch was taken by foreign flag vessels, so is technically considered an "import").

In recent years the fishery sector in Mauritania has seen great changes. Nevertheless, the increase in fleet size has been oriented towards the high value demersal fisheries, and the national capability to catch small pelagic species is negligible (and this sector receives no stimulation through the absence of a fish meal operation, even if small, at Nouadhibou).

Some trawler fleets, for example "CAM", have run into operational problems and have been laid up. Government encouragement of onshore investment has yielded substantial results, but it is possible that this investment has been so rapid that the profitability of a number of companies involved in such installations is now doubtful.

Perhaps the emphasis should now be on development of onshore processing operations, so that added value of the product finally exported may be greatly increased (individually packed fish, etc.)

In 1983 the overall landing of artisanally-caught fish in areas to the south of Nouadhibou was 6,397 tons, 3,500 tons being sent to Nouakchott and the remainder inland. The landings at Nouakchott were 5,014 tons comprising

2,486 tons taken by line, 193 tons by gillinet, 1,650 tons by seine net, 68 tons by beach seine and 10.4 tons by lobster gear. The artisanal catch at Nouakchott was 4,868 tons in 1982, and estimated at 6,607 tons in 1981 and 3,888 tons in 1980. Artisanal craft are reported to have landed 4,647 tons at Nouadhibou in 1982.

Japanese aid to the fishing sector has been quite substantial in recent years. Twenty Japanese trawlers of 12/15 metres length have been provided and are distributed between Nouadhibou and Nouakchott. The training school continues to function with Japanese aid. The Japanese have also delivered fibreglass canoes with inboard diesel engines, plus a 15 ton per day ice plant to Nouakchott, and 300 25 HP outboards. The Japanese equipment has been handed over by the Government to the Société pour la promotion de la pêche artisanale en Mauritanie (SPPAM) which came into existence in August 1983 with 35% of the share capital being held by the Government, 10% by the local cooperative and 55% by private interests. The private interests who hold 55% of the shares are comprised of Nouakchott businessmen.

Fishermen who buy equipment supplied by SPPAM will be obliged to sell their fish through this channel. The organization also received new vehicles from Japan for

marketing of artisanally caught fish. SPPAM will probably act as a "privileged broker" between the Mauritanian Government and the fishermen.

D Joint venture fishing company

Since 1978 the principle of joint venture cooperation has been favoured by the Government as a means of developing the Mauritanian fishing industry. As a means of development, the joint venture is made by common participation in the total value of capital on the basis of 51% for the national and 49% for the foreign partner. The different skills, costs and markets of the two countries or companies are combined to maximum advantage. This is easily seen because Mauritania offers resources, shore facilities and low-cost labour and the foreign company provides capital, management and market access.

The drawbacks of joint ventures are as great as the hopes placed in them. The greatest is risk: both commercial risk, which is generally high in fishing and the risk of financial manipulation by the dominant partner.

The purpose of joint ventures is on the one hand to promote the fishing industry which can provide employment, and on the other hand to stop or decrease the buying of commercial fishing licences, as a precaution against

over-fishing of the resource. However there is the need to make the policy flexible in order to make possibilities more attractive to the foreign investor. If since the introduction of this policy there are only six operational companies operating in the fishing industry, some questions might be asked and the answer may be because of some misunderstanding of the new fishing policy. The operating companies fairly well attained their objectives, as will be shown in the following table.

Table 1

Companies	Partner	Total productivity	Added value	Cost of operation	Number of personnel
ALMAP	Algeria	244.4	1.19	- 0.37	75
MAUSOV	USSR	922.1	15.38	+ 0.94	507
MSP	Sweden	401.0	2.45	- 0.72	221
SALIMAURES	Libya	310.9	3.08	- 0.94	241
SAMIP	Iraq	312.8	1.97	+ 0.64	45
SIMAR	Romania	537.4	8.96	+ 0.54	280
Total		2,732.2	33.03	+ 0.09	1,369

Source: Cooperation Mauritania/Norway, CONGAR/FAO/398/NOR/Jul.83.

The above figures have positively changed in 1984 as well as in 1985, but still serious efforts are being made to manage full financial and economical equilibrium. The Government should have a clear idea just what it wants to achieve by a system of joint ventures in fisheries, and that its views are communicated and clearly understood by

all parties. Publication by Government of guidelines or objectives of the new fishing policy should be made to give a comprehensive and clear view which can be understood by all businessmen interested in the fisheries industry.

However, the Government should actively seek to put the right man in the right place in the management of joint venture companies to ensure control and achievement of the national directives.

If we go back to the above figures, it is easy to note that only the pelagic joint venture companies are profitable, with 60 per cent of employees in all national joint venture companies. MSP and Salimauren together have 462 employees, which is indeed much more than the normal needs. Other accommodating practices should be avoided for better improvement of administrative management and realistic programmes of investment. There is also a permanent need of training the personnel appointed in the joint venture company and to familiarize them with modern systems of administration in a suitable environment and motivation.

E Small-scale fisheries

Marine fisheries world-wide are characterized by a dualism in the form of coexistence of small-scale or

artisanal fisheries side-by-side with large-scale or industrial fisheries. The dualism is not confined to the scale of operation, but extends to the type of technology used, the degree of capital intensity, employment generation and ownership. In contrast to large-scale fisheries, artisanal fisheries are owner-operated and labour-intensive, using little capital and hardly any modern technology.

Past development efforts have focussed almost exclusively on large-scale fisheries, presumably in the belief that small-scale fisheries were only a temporary feature of the transition from artisanal to industrial fisheries. It was presumed that small-scale fishermen would either acquire the new technology and join the race for offshore and distant-water resources, or they would find employment as crewmen in the large-scale fisheries. Alternatively, they could move to more lucrative occupations inland, which presumably would have generated rapid economic growth.

However, after more than three decades of fishery development, it is estimated that there are still about 10 million small-scale fishermen landing around 20 million tons of fish annually, which accounts for almost half the world marine catch used for direct human consumption.¹

¹ In the introduction of the FAO document prepared by Theodore Panayotou "Management for small-scale fisheries", Rome 1982.

Yet, with the exception of some motorization of canoes and the introduction of nylon nets, the fishing technology of small-scale fishermen in many parts of the world remained largely unchanged for decades. This, however, may have been a blessing in disguise for the economies of many developing countries which suffer from severe scarcity of capital and foreign exchange, ever-rising fuel-import bills and chronic under-employment. It has been estimated that the small-scale fishery uses one-fifth as much capital and one-fourth to one-fifth as much fuel per ton as fish landed and creates a hundred times more jobs per dollar invested than the large-scale fishery activities.¹

Yet in many developing countries, small-scale fishermen live close to or below the subsistence level, or at any rate they are among the lowest socio-economic groups in the country.²

Thus, the fundamental problem of small-scale fishermen around the developing countries is their persistent absolute and relative poverty, despite decades of remarkable overall fisheries development and national economic growth. Clearly, they have neither adopted the advanced fishing

1 In the introduction of the FAO document prepared by Theodore Panayotou "Management for small-scale fisheries", Rome 1982.

2 World Fisheries 375/79, article by Smith.

overall fisheries development and national economic growth. Clearly, they have neither adopted the advanced fishing technology, nor did they find employment in the large-scale fisheries, or elsewhere, as was presumed, for reasons ranging from capital market distortions and the consequent capital intensity of the large-scale fisheries to the limited mobility of the small fishermen, or the lack of alternative employment. Thus, there is a need to put small fisheries in the right perspective and examine the available policy options for improving their socio-economic condition and maximizing their overall contribution to national economic and social development.

The socio-economic problems of fishermen are currently attracting increased attention due to:

- . the realization that small-scale fisheries are not a transitory feature of fisheries development;
- . increased interest in improving the socio-economic conditions of low income groups in general, and
- . the new opportunities for local fisheries made available by the declaration of extended fisheries jurisdiction.

In response, since the introduction of the new fishing policy, the Mauritanian Government has considered development measures for upgrading small-scale fisheries. However, such efforts may be frustrated without a thorough under-

standing of the factors responsible for their upgrading or the factors responsible for their currently depressed situation and the existing potential for further development. Moreover, improving the standard of living of small-scale fishermen is but one of the objectives in a fishing policy. Other, often competing, objectives are employment creation, increase in fish supplies for domestic consumption and exports, and maximization of the economic surplus generated by the fishery.

The present situation of the small-scale fisheries in Mauritania can be summarized as follows:

- . it is comprised of around 2,000 small-scale fishermen (artisanal) using around 700 motorized canoes and mainpower bridge. The majority of the fishermen are from Senegal.

The problems associated with development of the Mauritanian small-scale fisheries is mostly the same as in many developing countries: total dependence upon small-scale fisheries to provide protein to the population. Yet the sector has a low priority in the national development programme; where there is some institutional establishment it is under-staffed and is primarily involved in policing activities. Many programmes which were introduced to assist small-scale fisheries (from international aid sources) were technologically out-phased

and too capital intensive. The most serious problem, however, is still the lack of understanding of the socio-economic aspect of small-scale fisheries. The present institutional structures of the small-scale fisheries are not adequate to cope with the complex matters of fisheries administration, management, or development, even at the small-scale fisheries level.

Small-scale fishermen in Mauritania are a very poor credit risk. They are poor because, among other things, they cannot acquire credit on reasonable terms, for example they have difficulty to obtain credit because they lack collateral required by traditional lending institutions.

EVALUATION OF FISH STOCK PER SPECIESTable 2

Fish species	Potential (in '000 tons)	Percentage of catch	Price per ton US\$	FOB value of stock (US\$) '000
Pelagics	426	65	190	52,611
Demersal	166	22	800	29,216
Cephalopods	59	9	600	3,186
Crustaceans	0.25	4	2,857	28,570
TOTAL	651.25	100		113,583

Source: CNROP - FAO, columns 1 and 2
Personal simulated calculation, columns 3 and 4
which give the expected return if the rate of catch is as above.

PHYSIO-ECONOMY OF THE FISHING COMPANYTable 3

	Capacity of storage (tons)	Capacity frozen per day (tons)	Investment in US\$,000
SALIMAUREM	4,000	50	10,500
SIPECO	2,000	60	4,400
SAMIP	1,500	N.A.	N.A.
COMACOP	4,000	50	8,000
SMEF	4,800	0	6,000
MAUSOV	3,000	0	3,500
SIMAR	1,500	50	6,000
ALMAP	1,500	60	16,000
SOFRIMA	1,500	60	350
MSP	1,500	50	3,750
TOTAL	25,400	380	42,500

Source: Document de travail MPEM.

DATA ON FISHING VESSELS

Table 4

Period: 1985

BREAKDOWN OF FISHING VESSELS	Deep water		Pelagics		Thona		Merlue		Crustaceans	
	A	T	A	T	A	T	A	T	A	T
Chartered	45	46	15	125	0	0	0	0	0	0
Licensed	4	8	0	12	20	3	13	10	23	31
National flag	56	98	0	0	0	0	0	0	2	4
Total	257		152		23		23		60	

47

A = artisanal
T = trawlers, with freezing capacity

Source: Service informatique MPEM

F Maritime administration

My paper will be very incomplete if I omit to talk about the role of the Ministry of Fisheries and Maritime Economy (MPEM), which is charged with the elaboration and implementation of government policies and decisions in this domain.

Such responsibilities include among other things: the coordination and management of marine resources in the State public domain; additionally supervisory responsibility in all the sectors by appropriate legislation and relevant organization.

In this section on strategy of development, I will present the organization of the Ministry of Fisheries and make a proposal of a new organigram, covering all the responsibilities of the Department. However I would point out that it is wrong to make a judgement as to "good" or "bad" in respect to any organization, the most important thing being to make communication among all departments possible, and to ensure cooperation between concerned parties.

The Ministry of Fisheries is organized as follows:

- Industrial Fisheries Directorate
- Artisanal Fisheries Directorate
- Merchant Shipping Directorate
- Directorate of Port Infrastructures

- Control and Supervisory Directorate
- Economic Forecasting and Regulations Directorate
- Maritime Districts Directorate

1 The Department of Industrial Fisheries is responsible for: development and management of maritime resources, planning, control and promotion, and orientation of industrial fisheries. This Department consists of two services, namely:

- (a) Service for industrial fisheries, responsible for promotion of industrial and semi-industrial fisheries as well as follow-up of investments in these sectors;
- (b) Service of control, which is responsible for supervision vis a vis industrial fisheries, namely control of fishing nets and fishing licensing.

2 The Directorate of Artisanal Fisheries, which is responsible for technical and/or training of local fishermen and in doing so, ensures proper organization of co-operatives, acquisition of appropriate means such as necessary financial assistance, as well as coordination of sales such as marketing of fresh fish catch in local areas, with purchase units for local and small-scale catches. There are two Services within this Directorate:

- (a) Service for training:
which is responsible for the training of local fishermen and in doing so enjoys the collaboration of the service for seamen as well as a centre for professional

maritime training. It also avails cooperative training within the framework of the division of cooperatives, and continental fishing.

(b) Service for equipment and infrastructure:

responsible for appropriate equipment; it also oversees the use of this equipment provided by the State.

Similarly, its responsibilities include control and supervision, and development/execution of artisanal projects.

3 The Directorate of Merchant Shipping is charged with studies relating to maritime transport, vessel negotiation in Mauritanian waters, management of the public maritime domain and maritime safety matters. It receives the collaboration of the Department of Ports Infrastructures. It consists of two services:

(a) Service of navigation and maritime transport. This service deals with the registration of vessels, delivery of sailing and navigation licences and other attributions comprising the State-owned fleet; it looks after control and supervision of vessels operating within the EEZ, as well as ensuring marine safety in conjunction with the Department of Port Infrastructures. This service is helped by two divisions:

Division of vessels

Division of maritime transport

(b) Service of training and seamen: has responsibility for the above, and ensures proper organization and coordination of trained personnel by way of ensuring appropriate choice of training programmes, as well as in-service training and re-training of existing personnel.

4 The Directorate of Port Infrastructures: has a unique function which is the management of the country's ports including construction, repairs, as well as supervision of naval installations herein. Besides it also ensures, in collaboration with the Department of Merchant Shipping, the administration of maritime auxiliary transport enterprises as well as pilotage stations.

(a) Service for ports and infrastructures: which is responsible for supervision, aids to navigation, traffic, personnel, cargo handling and towage.

(b) The Infrastructure Service: responsible for infrastructures, port handling equipment, auxiliary maritime transport enterprises, as well as pilotage and signalling for maritime traffic.

5 The Directorate of Control and Supervision: supervises and controls para-public and private enterprises and elaborates their investment programmes in conjunction with the Ministry of Planning. Similarly it consists of two services:

- (a) Service for control and supervision, and programming service: the first service implements investment programmes of para-public enterprises, related decisions of the Government bodies.
- (b) Programming service: makes studies and examines all matters related to the creation of State and private enterprises.

6 The Directorate of Forecasting and Regulations: is responsible for analysis and preparation of economic studies and regulations. It operates closely with all the other Directorates, and examines the contracts and agreements to which the Government is party. This Directorate is also responsible for promoting the marketing of fish and fish products, and provides statistics and documentation. This Directorate is divided into two services: Service for Planning and Statistics, and Service for Economic Studies and Forecasting.

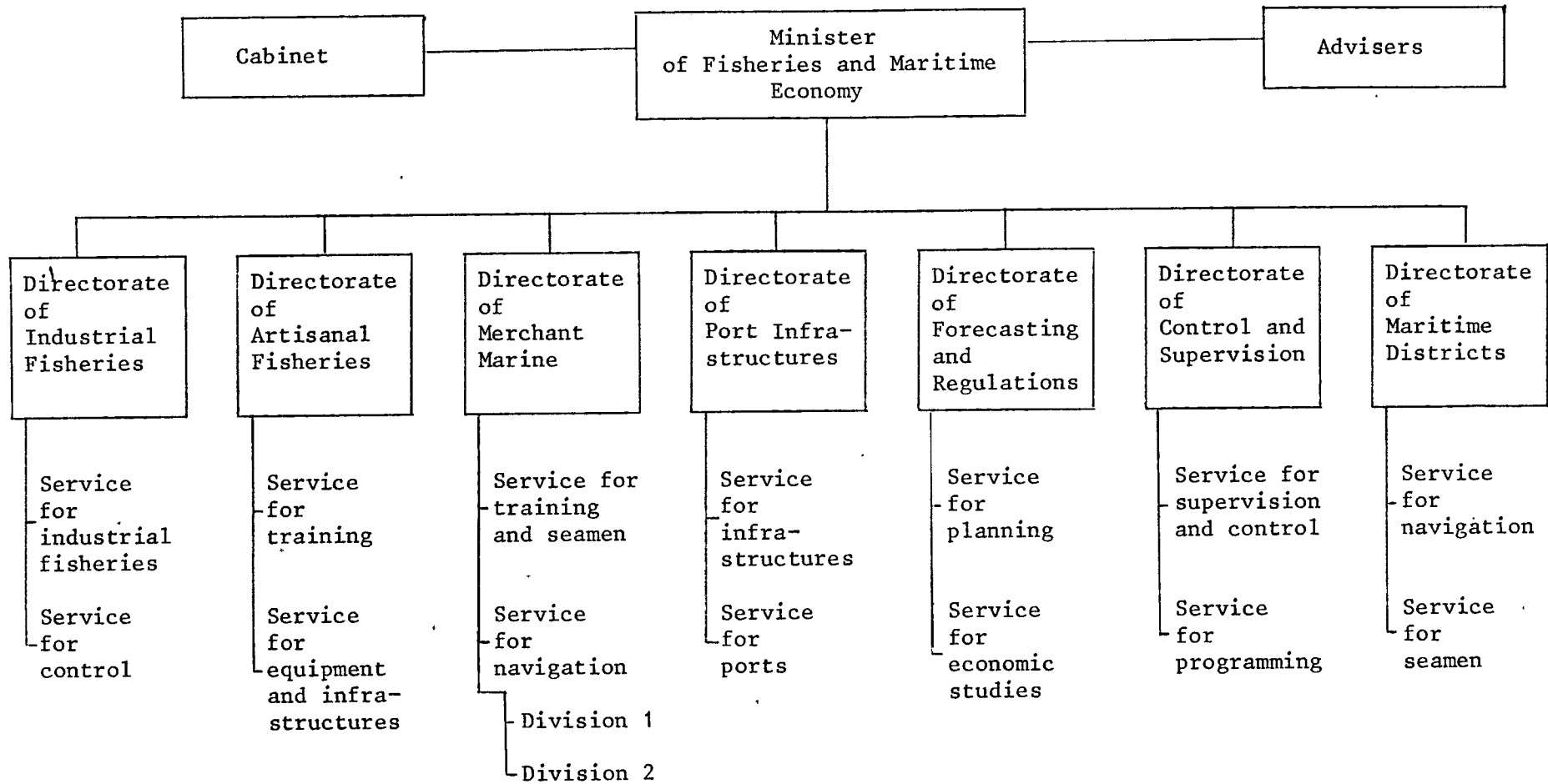
- (a) Service for Planning assembles all data and examines projects submitted to it in cooperation with other services. It is helped by the Division of Oceanography.
- (b) Service for Economic Studies examines commercial contracts, fishing agreements, maritime transportation studies, as well as other matters concerning prices and fisheries production.

7 The Nouadhibou Maritime Directorate looks into the application and implementation of maritime legislation, as well as control of ships and vessels operating within the country's territorial waters. This Directorate supervises the use of fishing permits, training of local fishermen and adjudicates matters in which the above are involved. Closely associated to these important tasks is the Service for Navigation and Service for Social Affairs.

- (a) The Service for Navigation ensures the application of rules and regulations in marine matters and monitoring of the application of fishing policy as a whole.
- (b) The Service for Social Affairs concerns itself mainly with seamen's labour matters, and training.

MINISTRY OF FISHERIES

The present organization from 1983



IV. MONITORING, CONTROL AND SURVEILLANCE

As I said in the introduction of my paper, it is clear that, with the UN Conference on the Law of the Sea drawing slowly to its conclusion, the new pattern of jurisdiction over fisheries has become a concrete situation. Most coastal states have adopted national legislation that gives them authority over fisheries in the area beyond their territorial waters, usually to 200 miles. This authority may take the form of the establishment of an Economic Zone, but several countries have adopted different systems, although the effect on fisheries is essentially the same.

A Effects of the Law of the Sea in coastal countries

These countries are now considering how they should act to take advantage of their new opportunities and to undertake the new responsibilities created by this new situation. It requires a surveillance system to know what is happening within the Economic Zone and, as found desirable, to control the fishing activities in the zone by foreign and national vessels. Such monitoring, control and surveillance systems can be very expensive, and the choosing of a system - indeed to introduce or not, any special dedicated ships or aircraft - is a difficult decision, especially since the benefits can be quite difficult to assess. Many of them may indeed not be quantifiable at all, certainly not in simple economic terms. Countries may install a monitoring, control and surveillance system to satisfy pressures from local fishermen, or to assert national

sovereignty, as well as to ensure that they get their full licence fees for foreign vessels. Certainly the decision on whether to install a system, and what system to adopt, will rarely be made wholly on economic grounds, and is highly unlikely to arrive exactly at the economic optimum where the marginal benefit from a small increase in system effectiveness is equal to the economic cost.

Apart from the fact that economic criteria are not the only ones used in choosing a system, another problem in attempting to match marginal cost and benefits is that benefits may be highly discontinuous. Most benefits will ultimately come from the application of appropriate conservation and management measures. An MCS system is necessary if, without a system, there is poor compliance with these measures. Experience in Canada, for example, has shown that up to a certain level of surveillance few fishermen may comply with regulations, but beyond that level, most fishermen are law abiding. This is reasonable, if each fisherman makes a similar individual calculation of the balance between the personal benefits from illegal fishing and the risks of detection and prosecution.

Nevertheless, some cost-benefit analysis will always be useful in reaching a decision. For example, if one of the major objectives is to protect the jobs of the coastal fishermen, an analysis that showed that the cost

of a system would be of the order of 70,000 UM per year for each job protected, would make the Planning Authorities consider very carefully whether there were not alternative ways (e.g. a job-provision programme completely outside fisheries which would achieve the same objective at much less cost). The general theory of cost-benefit analysis is well known, and described in numerous texts. This theory is particularly concerned with allowing for the fact that in any programme, the benefits will not start to accrue until some time after costs are incurred, 70,000 UM of costs in one year not being exactly equivalent to 70,000 UM of benefit in the following year. This is not concerned with the aspect of analysis, but with the problems that are specific to fisheries, particularly of how to determine the future pattern and level of cost and benefits. It is also not concerned with attempts to arrive at the exact prescription of what MCS systems should be adopted in any particular situation. This will depend very much on local conditions and will be a matter of local decision.

The goal is to set out the nature of the cost and benefits that will arise, including some of those that may not immediately be obvious, so that it will be easier for local authorities to make a realistic analysis.

B Problems of surveillance

In the long run, effective implementation of surveillance/enforcement strategies is critical for the success of any system of fisheries management. Without such capabilities, substantial benefits from the fishery that should be collected by the State will be dissipated and the viability of stocks in question over a period of time can be seriously jeopardized. The functions of surveillance/enforcement systems are the same, irrespective of stock composition or geographic location, but both of these variables have considerable impact on the degree of difficulty which may pertain to the performance of these functions. Moreover, the level of capability of the coastal state is also crucially variable.

There are several proposed fisheries surveillance systems: to monitor the movement of vessels in the extended fisheries or economic zone; to determine whether or not they are domestic or foreign fishing vessels; to determine whether or not they are licensed and if so, whether they are operating in accordance with the stipulated regulations affecting time, area closures, gear, sex/size restrictions, levels of incidental catch of protected species, and total catch, if quotas are involved. These proposals require at least the operation of aircraft, the placement of valuable, well-trained observers on board fishing vessels, regular radio

reporting by fishing vessels when operating within the zone, the operation of high-speed patrol craft which allow boarding and inspection on the fishing vessels, and, if possible, inspection of landing of the catch.

The proposed enforcement systems are designed to apprehend and arrest fishing vessels in violation of the regulations and to impose effective punishment in a timely, systematic and non-discriminatory manner. Beyond technical capabilities, these imply the need for specially trained manpower, clear and uniform administrative procedures which must often cross internal jurisdiction, courts and legal bodies.

There are great obstacles in attempting to perform in the context of Mauritanian fisheries as a result of several factors towards coordination with the national Navy, Ministry of Fisheries and Brigade Maritime.

C Problems of monitoring

The amount and quality of available information on stocks and fisheries are critical variables for both biological and economic reasons. For stock assessment purposes, one would ideally like to have the following array of information:

- (1) stock abundance and distribution by species;
- (2) natural mortality rate by species;
- (3) growth rates by species;
- (4) recruitment into the fishery;
- (5) critical size necessary for reproductive needs;
- (6) environmental and ecological effects.

In CNROP there does not yet exist a comprehensive detailed picture of the stock in question. However in recent years considerable new information has been made available. The most extensive information available is that maintained by CNROP, FAO and ORSTOM (Rapport du groupe de travail CNROP/FAO/ORSTOM Nouadhibou du 16 au 27 septembre 1985).

The biological information available, while insufficient, has improved, but there is still a very wide gap between the available data and its assessment for managerial purposes in the region. It is unlikely, furthermore, for the Mauritanian administration to perform this assessment on its own in the foreseeable future.

In this respect, there is a need for considerably more on the environmental and ecological relationship of the species in question.

Ⓓ Cost of MCS

There are many elements in an effective MCS system, but some of these - for example, some unit within the

national administration with direct responsibility for fisheries, or a legal system able to impose appropriate penalties on a fisherman, local or foreign, convicted of an offense against national fishery regulations, once he has been apprehended and brought before the courts - can be assumed to exist, and only the burden placed on them taken into account in the analysis. The activities specific to a MCS system will consist principally of ships and aircraft to operate on the fishing grounds for direct surveillance and control of fishing operations, special observers on fishing vessels (especially large, long-range vessels), staff at the landing places to control the catches once they come ashore, and special central administrative staff.

Some of these costs, e.g. port inspection, or of control centres, are clear enough, but others can be subject to much discussion. Naval patrol vessels, for example, may continue to carry out fishery duties, but while at sea also carry out other tasks such as control of smuggling, search and rescue, etc. The question of who pays for the time of such a vessel, and in what proportion, raises issues which go beyond cost-benefit analysis. For example, if fishery control is the prime task then it might properly be a charge on the fishery budget, and this might (indeed probably should) imply that for the period of the assignment the vessel would

be under the direct operational control of the fisheries department (Ministry of Fisheries).

There is also the question of whether the use of vessels or aircraft is economically worthwhile and this does not depend on whether they are paid for by the military or the fisheries department, though the decision on what to do may be determined by the accounting system used. It is much easier to switch support to local fishermen from a system of controlling foreign fishing to development of a fishing port if the funding is the fisheries department or either case.

While it is easy to estimate, to some useful approximation, the cost of a given MCS system, and more approximately the proportion of offenders that will be detected, it is less easy to know how effective such a system would be, or to estimate what system, and hence what cost, would be required to achieve a certain level of effectiveness, e.g. to be sure that at least 95 percent of all foreign vessels fishing in the EEZ carry licences, or that a certain catch is not exceeded by more than 10 percent, or that not more than 5 percent of trawlers are using undersized meshes. For this it is desirable to put oneself in the place of the fishermen, whether foreign or domestic. He too will be making a cost-benefit analysis - if not in formal terms, then at least in terms of thinking "is it worth it?"

E Guidelines for surveillance operations

A) Fisheries surveillance may be considered as having three principal approaches, viz.:

- 1 to quantify the control problem in terms of fishing vessels, by number, type and pattern of fishing;
- 2 to ensure a reasonable level of adherence to existing control and monitoring measures; and
- 3 to gather information as a data base for a variety of related analyses.

B) The process of surveillance may be itemized as follows:

- 1 establish a suitable patrol area within the zone of jurisdiction compatible with the range of the surveillance vehicle;
- 2 establish contacts;
- 3 categorize contacts:
 - a) position;
 - b) type of vessel (fishing vessels, merchant ships);
 - c) enquire whether engaged in fishing or related activity;
 - d) establish nationality of the named vessel;

- e) establish identity (radio call sign, registered name);
- f) establish method of fishing;
- g) acquire specifics of gear, both in use and on board (type of trawl, lines, number of hooks);
- h) acquire details of catch on board in terms of quantity, species and size;
- i) verify documentation;
- j) examine facts against existing regulations appropriate to vessel's nationality, type and fishing zone for possible infringement with current directives.

C) For surveillance purposes there are a number of hardware options:

- 1 aircraft
- 2 surveillance vessels
- 3 others

The facilities and procedures outlined herein are of necessity general in nature. It must be recognized that there are a myriad of decisions essential to an effective surveillance and enforcement regime which rely on detailed knowledge of the national, legal, economic, geographic and social situation. It should also be borne in mind, in establishing a regime, that a considerable amount of

equipment and hardware is currently offered in the surveillance field and a careful evaluation of this should be made before purchase, given the factors noted above.

F Enforcement of national rules of MCS

There is great need for Mauritania to concentrate on conservation of resources as it advocated by the overview of the new fishing policy in 1978. This should be one of the prime considerations. The Department of Fisheries has to consider how to catch illegal fishermen, how to deal with fishermen who have exceeded their licence, or have no licence at all.

The fish stocks in Mauritanian waters are highly attractive and the country was and still is faced with the problem of vessels fishing illegally, mostly Korean, Spanish and Japanese trawlers. After deciding several rules of trespass procedures against pirate vessels, the Government was obliged to decide the confiscation of any vessel illegally fishing in its waters (Ordonnance 80 230 of 1 September 1982). This Ordonnance was not able to decrease the illegal fisheries and was followed by Ordonnance 84.001 of 1984 which stated that the confiscation of the vessel procedure was still in force, and additionally the crew would be arrested and held until the

owner negotiated their situation and the future of his vessels. In 1985 there were only very few vessels which fell victim to this regulation and some difficulties existed in applying the rule fully. For example, difficulties in apprehending the vessel, which after all is operating under a foreign flag and where actions leading to the need for repairs in a foreign country can lead to legal litigation.

Therefore there is an urgent need for Mauritania to achieve ship repair capability in order to keep all the national fleet in operation and ensure that they will not have any constraints abroad, and also to earn foreign currency for repair of foreign vessels.

As concerns the crew of apprehended vessels, the writer would advise to provide them with normal facilities, with good accommodation in our hotels at the cost of the shipowner, which will oblige him to be in touch with the national authorities as quickly as possible.

The fishery patrol officers (navy and gendarmerie) should have good training for detecting all infringements including mesh net of the filet and the fishing zones.

Once the need arises for surveillance and enforcement the question is how to do it. There are three main methods,

the most expensive of these being air surveillance, although the use of regular, scheduled airliners to report on activities in ocean areas is one good means. It is also possible to use light aircraft for surveillance purposes.

There is a veritable arsenal of sophisticated coastal patrol equipment available today, as industry has not been slow in responding to what will be gained by providing good control of the EEZ.

The national fishermen also need an education and information campaign as they must be informed about the need to adopt conservation measures and to understand the threat to their livelihood through depletion of the fishery resource. This can be achieved by involving the fishermen in all aspects of fisheries management, whether it be in conservation, surveillance or enforcement.

In the short term it would be of great assistance if the navy could be reinforced by the procurement of new patrol vessels, specialized in the control of fishing vessels, even perhaps supported by financial contributions of Mauritanian fishermen.

V PROSPECTS FOR DEVELOPMENT OF MARITIME
 INDUSTRIES IN MAURITANIA

This chapter deals briefly with the prospect for development of ocean industries as a whole in Mauritania, and with the possible contribution which this industry can make to growth and development in the country.

A new era of the ocean, which gives important economic implications for Mauritania, is about to unfurl. The new law of the sea and its extension of coastal state jurisdiction gives important implications for the role of marine industries in national and regional development.

Mauritania has a number of economic characteristics. Firstly, there is a heavy reliance on primary industries for economic growth. Secondly, infrastructural facilities crucial to industrial development and economic diversification (such as transportation networks) are relatively poor. Thirdly, there is great dependence on imported manufactured products, therefore a permanent need for foreign currency. Finally, high levels of population growth have resulted in a rapidly expanding labour force with a relatively low level of education and skills. These economic characteristics, accompanied by political unrest, are responsible in the great part for serious developmental problems.

A Prospects for fisheries development

The prospects for fisheries development in Mauritania can be favourable in the coming years. With the extension of fisheries jurisdiction, Mauritania has full control over the exploitation of living resources. Favourable demand conditions, along with possibilities for expanding fish production through the increased exploitation of the resources, the displacement of foreign fishing efforts, or a combination of both, indicate that the fishing industry in Mauritania should expand during the coming years. To ensure this, however, improved management, as well as comprehensive planning for fisheries development, will be required.

B Fisheries management and planning

The problem of fishing management is very complex, because no state can promote any management without the contribution of adjacent coastal states. Thus the conservation and proper management of stocks will require considerable cooperation between states in order to be effective.

The advantages of sharing and managing fish stocks have been perceived for some time; many of the smaller states are aware that they do not have the financial and technical capabilities for proper management. It is advisable to combine capital effort in the sub-regional

States: Mauritania, Senegal, the Cape Verde Islands, Gambia and Guinea-Bissau can institute high-level collaboration in the conservation and management of fish stocks in their sub-region.

The five States can aim their cooperative efforts at: biological research and standing fish assessments; control of sub-regional waters; training and the further development of artisanal fisheries; the application of common regulations for foreign vessels; better statistical control of foreign catches; and harmonization of the licence fees charged to distant water fleets.

The development strategy of Mauritania in the marine field is interrelated to the sub-regional cooperation. Therefore the economic fortunes of individual countries will vary, depending on their economic strategies and political stability. The efforts of CEDAO may be useful in bringing about greater economic integration among the countries and, by encouraging the movement of labour and capital, reducing the income disparities which now exist between them. A strategy for the region as a whole is also important since: it can be a guide for other countries if their development strategies are consistent with the overall regional approach; and, it can enable individual countries to identify the areas which are problematic from a developmental viewpoint.

C Perspectives of development

There are at least five major types of problems which must be addressed in planning of development and management in Mauritania.

1 Improvement of management

The development of the technical and managerial expertise necessary for the effective exploitation and regulation of the ocean is a crucial component of any activity for all sectors. The required expertise can be of two types. On the one hand, the State will need broad-based managers for public service, sufficiently skilled in a number of ocean-related disciplines to regulate and manage with an awareness of the multi-sectoral nature of ocean development, and of the inter-connected and often conflicting requirements of different ocean uses. At the same time, more technical and unisectoral specialists will be needed, both in government service (as the field personnel in management systems) and for private and parastatal activities.

2 Domestic capacity enhancement

Investment, whether private or public, local or foreign, will be essential to the improvement of domestic capacity in such industries as fisheries. It is in fisheries that such investment is most urgently required,

given the present situation in which a known resource exists but is heavily exploited by foreign fleets.

3 Scientific information base

All activities in the ocean, both developmental and managerial, are dependent upon knowledge of the natural phenomena which govern the environment. Beyond provision of straight-forward information, such as the location of fish stocks and other mineral reserves, scientific research is required to establish the data bases and managerial models to allow for rational control of fishing quotas, pollution contingency plans, muricultural development and any number of other activities. In Mauritania, there is a serious shortfall in this area.

The former difficulty can be partially remedied in the short-term by greater access to and dissemination of results from foreign research activities in the EEZ, an option made possible by the new regime of cooperation for marine scientific research. The problem of local capacity can only be met in the long term through investment in regional research facilities and increased training of ocean scientists.

4 Regional harmonization of approaches

In the fisheries, as well as in a number of other sectors, the effectiveness of an individual state's

policies will be greatly enhanced if some degree of regional or sub-regional harmonization of policy can be achieved, for example in pollution control and vessel (VTMS), a consistent regional approach will make compliance by foreign vessels passing through numerous zones much more feasible.

Negotiation of a coordinated access agreement with distant-water fishing nations would give far more leverage in securing concessions, while "pooled" fishery surveillance and enforcement efforts would be less expensive and more effective.

5 Project of fisheries

The Mauritanian fisheries, faced with problems of management and control, will require increased attention in the national fishing policy which should be achieved and followed by plans and programmes. The following areas will be of particular importance:

- inventory of fishery resource potential, both inshore and offshore;
- port and boat landing site development, including equipment storage, ice facilities and cold storage;
- improved techniques to increase fishermen's capabilities, including training and equipment designed to complement artisanal operations;

- marketing infrastructure development;
- protection for endangered and over-exploited species;
- cooperative surveillance and enforcement of fisheries regulations;
- concentration on training and research.

The new regime concerning the world's resources, as embodied in the United Nations Convention on the Law of the Sea of 1982, and in the actions and practices of States, particularly since the mid-1970's, has resulted in global acceptance of the coastal states' authority to manage fisheries within their jurisdiction. This authority creates new opportunities and responsibilities for coastal states, and brings problems of adjustments to countries operating distant-water fleets.

There is thus a need for Mauritania to review its strategies and policy concerning fisheries management and to introduce planning development in the small-scale fisheries as well as in the industrial fisheries.

In this period of changes, the challenge is to provide a new and improved basis for the rational management and utilization of the fisheries resources, with due regard to the requirements of the new fisheries regime. Moreover the new regime of the sea gives the opportunity for fisheries to play a greater role in national food supplies, thereby helping to alleviate under-nutrition and contribute to world food security. Fisheries development through relevant planning can contribute to the betterment of the socio-economic conditions of the whole country. In this respect, the reassessment of strategy and policy for the fisheries sector must take full account of the present and

potential contributions from marine fisheries, both within and outside exclusive economic zones, as well as from inland water fisheries. Furthermore, the essential factors of production such as fishing boats, gear and technology, skilled personnel and research capacity should be considered.

A The contribution of fisheries to national income, social and nutritional goals

Mauritania has a sovereign right to determine its policy for the development and use of its fishery resources. There is a range of alternative objectives, for example, food production, earnings in foreign exchange, generation of income and employment, resource conservation, which may be complementary in a development plan rather than conflicting for the government in setting its priorities from this range of policy alternatives. Equally clearly, there is no single model for fisheries resources, national aspirations and social economic targets. Therefore the Government has to determine more clearly its policy and objectives in the light of its particular situation and requirements.

1 Fisheries comprise complex human and inter-sectoral activities of the overall national economy and within a society in general. Therefore fishery development plans should be an integral part of national economic development and food security plans, and be in accord with social

and nutritional goals and established priorities. The formulation of medium and long-term plans, as the central element of fishery development, should be borne in mind in the planning of development by the national decision-makers.

2 The setting of objectives should be based on an assessment of the fishery resources available, existing technology, markets to be served, social and economic activities and other relevant factors, including foreign operations, where applicable.

3 Fisheries development is often aimed at serving more than one complementary objective, but multiple objectives are not always necessary compatible. Where compromises have to be made, it is necessary that the objectives be explicit, the comparative advantages be indicated and their relative priorities made clear.

4 Since the conditions within which fisheries are conducted are highly dynamic, objectives which may be appropriate at one point in time may not be appropriate at another. Periodic evaluation of the validity of objectives is a necessity.

5 As a basis for fisheries development, there is a need for the government to establish mechanisms and develop skills

for fisheries planning, involving all relevant disciplines.

6 Careful management and investment planning is necessary to achieve optimum utilization of resources. To this end, Mauritania should introduce appropriate conservation and management measures based on scientific evidence. Where there is little information on the resources and potential yields, expansion or investment should be undertaken judiciously.

7 Reliable and timely data and statistics on all aspects of fisheries are needed for the planning, implementation and subsequent monitoring of fisheries management. The national capacity to collect data and information should be developed. Regional and sub-regional cooperation on collection and dissemination of data should be encouraged whenever necessary.

8 It is essential to enhance the capacity of the State in stock assessment in order that it can determine the allowable catch of the living resources in the areas where it exercises sovereign rights.

9 Development plans should take account of all aspects of the fisheries sector, not only harvesting, processing, marketing, servicing and material supply, but also the development of the infrastructure, technology and human

resources to enable the fisheries sector to better exploit its fishery resources, to increase the value added to the economy and to improve employment opportunities. It is essential to make all those involved understand the social value of fisheries as a source of food, employment and profit, hence the need and the desirability of using fishing methods and processes which do not jeopardize economic viability by exhausting resources.

10 In the formulation and execution of fisheries management and development plans, close consultation and collaboration is required between administrators, scientists and those involved in fish production and marketing:
FIAP, SMC, BCM, ...

11 Small-scale fisheries development requires in most cases special support from government. An integrated approach through and with the participation of the fishing community is often the best way of channelling technical, financial and other forms of assistance. It is important to design and adopt technologies appropriate to local conditions.

12 Support from the government could include financing schemes for the renovation and expansion of the fleet for industrial and small-scale fisheries.

13 When planning the development of fisheries, attention should be given to the production and marketing of low cost product for human consumption. More research efforts should be directed toward developing new products of acceptable quality, such as the conversion of fishmeal raw material into economically viable and acceptable products for direct human consumption.

B' Improved national self-reliance in fisheries management and development planning

The following principles and guidelines should be taken into account when reviewing training needs and establishing training programmes, in pursuit of the overall objective of improved national fisheries.

14 Training programmes should be elaborated within the context of overall national fisheries development plans and management policies.

15 Training programmes should be based upon clearly defined needs and realistic assessments of existing trained or experienced manpower and current technology. Training should be categorized as to subject and target recipients. Government should also determine which programmes might be undertaken using local resources and which ones need regional and extra-regional expertise.

16 Because of the increased emphasis on policy formulation and the design and implementation of management schemes, training programmes should be organized for high-level administrators responsible for the fisheries sector. Training of mid-level personnel is equally important for implementation of development plans. Facilities should be maintained for continuous professional training.

17 Improved training techniques and methodologies need to be developed and special training equipment and simple materials should be prepared to meet the needs of illiterate and semi-literate people. In this respect, efforts to raise the general educational level in fishing communities are important. Institutional and on-the-job training of both deep-sea fishing crews and artisanal fishermen should be enhanced. The use of fishery cooperatives for training purposes should also be encouraged.

18 Particular attention should be paid to the design and monitoring of on-the-job training programmes for selected fishing communities. Attention should be given to the training of local fishermen and fisheries administrators in basic resource management, in environmental protection, in the operation and management of fishermen's organizations and in activities associated with social development.

19 As women play a prominent role in production, processing and marketing in small-scale fisheries in Mauritania, they should be included in all appropriate training activities and, where necessary, special training should be designed for them.

20 Government should endeavour to provide incentives to ensure that manpower trained in fisheries is effectively deployed and retained within the fisheries sector.

21 Encouragement must be given to the education of the consumer so that they can take fuller advantage of the nutritional benefits of fishery products, particularly in regions where there is no tradition of consumption, such as Atar-Nema and other cities in the country.

22 The licensing centre for seamen in Nouadhibou (CFPM) should be reorganized in order to be able to provide courses for officers and well-trained seamen. In this respect full reorganization of its role is required and the appointment of the right people in the administrative staff.

C : Towards rational management and optimum use of fish resources

Management should be conceived and understood not as a constraint upon national exploitation, but as an essential tool for the sound, sustained development of

fisheries. Hence, management of fisheries is an integral part of the development process.

The formulation of management decisions should be made on the basis of the most reliable data and research on the biological, environmental, economic and social aspects of fisheries. The fishery department needs to acquire the relevant knowledge, wider competence and experience, as well as the structures necessary for the design and implementation of conservation. Indeed, the successful exercise of national authority to obtain benefits from fish resources in exclusive economic zones will depend in large measure upon the ability of national fishing management to manage those resources effectively, including those stocks which lie within the waters of more than one state.

The following principles and guidelines should be taken into account when re-examining approaches to the rational management and optimum use of fish resources.

23 Although fishery resources are renewable, they are subject to over-exploitation, depletion and to the influence of environmental factors. Their management should be based on knowledge of their magnitude, of their distribution, variations in annual recruitment levels, and the interaction between species. Initially such knowledge may only be approximate but, as exploitation intensifies, more precise.

Government should therefore build up adequate research facilities, including research vessels, and formulate research programmes.

24 Owing to the need to understand better the natural fluctuations of fish stocks and the relationship between these fluctuations and environmental factors, the focus of management should be shifted toward entire ecosystems using experience gained in the management of single stocks.

25 Because of the unique conditions under which fisheries are carried out and the characteristics of the new fisheries regime, the Government should play a major role in fisheries management. This role includes the acquisition and dissemination of information; the formulation of objectives; the adoption of clear fisheries policies; and the design and implementation of management measures and the continuous evaluation of the results.

26 Legal and administrative frameworks are required to ensure that management systems are properly formulated and applied. Effective policy implementation calls for clear specifications of management objectives, close coordination and communication, and well-defined lines of responsibility and accountability.

27 Where there is open access to the resources for nationals, there is little incentive for individual fishermen to conserve the stocks. As stocks become fully utilized, competition among fishermen often leads to depletion of the resources, severe over-capitalization and lower earnings for individual operators. To prevent such consequences, the Government should seek to ensure that fishermen have clearly-defined fishing rights and that the catches do not exceed the productivity of the resources.

28 In the present rule 78-043 (Portant code des pêches et de la marine marchande), there is not any statement about pollution of the sea, which indeed influences the maritime ecosystem. Therefore the Government, with international assistance, should take steps to prevent or abate pollution and any form of environmental degradation which may result from various aspects of economic development, thus helping to maintain fish resources in good condition, to protect critical coastal ecosystems such as mangroves, and to secure the quality of fish as food.

29 Mauritania should cooperate in ensuring the conservation, rational management and optimum utilization of the same stock or stocks of associated species occurring within the exclusive economic zones of two or more coastal states (Senegal, Morocco, Cape Verde Islands and Gambia)

and occurring bothin within the exclusive economic zones and in adjacent areas on the high sea, in accordance with the UN Convention on the Law of the Sea, in particular with respect to its provisions on the role of the regional fisheries organizations.

30 The states of CEAO and CEDAO should cooperate in the harmonization of management regimes so that national regulations do not conflict with each other. Such cooperation could include harmonization of fisheries legislation and, where appropriate, access regimes and cooperation control mechanisms for foreign fishing operations, processing and transshipment operations.

31 Provide efficient monitoring, control and surveillance mechanisms for foreign fishing vessels, as well as the national fishing fleet. In that respect the national navy responsible for MCS should be more equipped in patrol and data work with respect to all the licensed vessels.

32 The relevant agreement should include provisions to facilitate cooperation aimed at protecting national operations, promoting the transfer of appropriate technologies and developing national capacities.

D. Role and needs of small-scale fisheries

As the focus of national and international assistance is increasingly directed toward small-scale fisheries, and

as the production from small-scale fisheries is devoted almost entirely to domestic consumption and represents about half the world supply of fish for consumption, special efforts should be made to increase the production of small-scale fisheries and to give priority to this sector in fisheries development policies. For this purpose it is particularly important to fulfil the needs of the small-scale fishermen by increasing their incomes and improving the lives and those of their families, as well as their environment. Small-scale fisheries also have an important role in providing income and employment to large numbers of fishermen and their families, who form part of the poorest and most disadvantaged communities in society. Whilst in many places a major problem is the number of fishermen in relation to the size and productivity of the resources, it is politically and socially difficult to limit entry into the fisheries because alternative sources of employment and income are scarce. Moreover, fishermen, as well as fishing villages (Fouta village and Imragen campus) are dispersed and either unorganized or only loosely organized, making it difficult for Government to respond effectively to their needs. Another problem is to reconcile the activities of small-scale and industrial fishermen exploiting the same resource in the same area; this has important social, economic and political implications.

The following principles and guidelines can be taken into account when establishing policies and implementing programmes for the development of small-scale fisheries.

33 In planning for the development of small-scale fisheries, due consideration should be given to the needs for provision of shore facilities, adequate marketing and distribution infrastructure, services and financing.

34 The reduction of post-harvest losses through improved handling, processing, transport and distribution systems should be given high priority as it will make an important contribution to the betterment of the small-scale fisheries sector.

35 Education and training and other forms of social investment should be made an essential part of small-scale fisheries development. More extension workers should be trained within cooperatives and small-scale fishing communities, in particular in fisheries technology, social welfare and community development and in the management and operation of small-scale enterprises and organizations. The link between extension and practical research should be strengthened. Due consideration should be given to the special role of small-scale fisheries as a major source of local consumption.

36 Fisheries development programmes should recognize that women often play an important role in fishing communities, both in trading and processing, and provision should be made for enhancing that role.

37 The cooperation and participation of fishermen is necessary to ensure the success of small-scale fisheries management schemes. The fishermen's organizations should be considered as a channel through which management decisions can become operative and technical/financial assistance delivered.

38 The adaptation and modification of locally developed methods and equipment for use in small-scale fisheries should be carefully considered before directly transferring technologies developed elsewhere, especially the introduction of capital intensive technology.

39 The Ministry of Fisheries should ensure, through different organization, that the interests of small-scale fisheries are given due consideration in plans concerning water and land use.

40 Optimum resource utilization and upgrading of the socio-economic status of the fishermen requires a proper definition of small-scale fisheries, taking into account the technical means and methods utilized, spheres of action and the specific system of enterprise involved.

E Investments in fisheries management and development

After several years of sustained growth, investment financing for fisheries management and development from international and regional funding institutions, as well as bilateral donors, has lost momentum. Reviews of the performance of past fisheries investment projects during the last decade indicate that they have often encountered significant problems during their implementation. Insufficient attention has been given to ensuring that investment opportunities are sometimes overlooked and meet identified needs. Furthermore, investment opportunities are sometimes overlooked. A contributing factor for this appears to have been a lack of coordination between agencies, donors and financing institutions concerned with fisheries development.

The following principles and guidelines can be taken into consideration by the Ministry of Fisheries, technical assistance agencies and funding institutions in examining ways of increasing the flow of financial resources for fisheries management and development, and of improving the efficiency of investment programmes.

41 Investment projects in fisheries should be based on the best available information on such matters as fishery resources, equipment for the upkeep of this resource and markets, and integrated into national development plans.

42 As the need of small-scale producers is not solely for capital, the investment package can include provisions for institution building, education, training and extension services, and may on occasion require marketing and social welfare components. The social investment needs of the small-scale fisheries sector in such fields as improved communications, health and water supplies, merit greater attention. Appropriate use should be made of food aid in increasing the consumption of fish products and in promoting fisheries development.

43 Where required, national credit systems should be rationalized and be made more accessible to small-scale producers and investors in the post-harvest sector of fisheries. Institutional arrangements should be created to enable the small-scale fishery sector to make effective use of investment funds. Potential beneficiaries should participate in the elaboration and implementation of investment programmes. Encouragement should be given to use credit systems which are in line with the financial possibilities of small-scale producers, particularly easy-term loans for procurement of supplies and equipment.

44 The Government must give full attention to training of personnel required to maintain the momentum gained through the investment projects, and international agencies should assist in this task by expanding their cooperation in training activities.

45 The policy of joint fishery enterprises should be encouraged, developed and expanded between developing countries, particularly African and Arab countries. Cooperative work in new product development and in fishing, processing and preservation technologies and regulations, intra-regional trade in fish and fishery products in particular through the institution of compensatory mechanisms, in order to encourage commercial activities among Mauritania and neighbouring countries, and to promote fish products on the international market.

46 The exchange of expertise in fisheries management and development at the regional or sub-regional levels should be promoted, for example, through specialized workshops and the use of regional research and training facilities. Such regional or sub-regional cooperation should also embrace surveillance of the exclusive economic zones, particularly the pooling of surveillance capabilities and means. To be most effective, such regional or sub-regional collaboration requires adequate follow-up activities and support.

F Marketing and international trade

It is easy to understand that Mauritania cannot have, at the present stage, a competitive position in the international market, even though their resource is high quality fish. Marketing is a part of the overall fishery management problem, because if the fishermen cannot earn competitive prices for their product through local or international markets, their situation will be affected and they could become disinterested.

Prior to 1984, marketing was carried out by the fishermen themselves in Las Palmas (Canary Islands) and they found that they were faced with a "take it or leave it" situation. Because of this situation, and taking into account that fish is a perishable product, therefore needing rapid consumption or alternatively storage in the frozen-store market, the unique issue was losses after losses, both for the fishermen and the Government who were expecting to earn foreign currency. To identify the problem is one thing, but to find a solution to it is quite another.

In 1984 the Government established a unique company, SMC, for marketing of all Mauritanian fish products. Its purpose is to buy all the fish landed in Nouadhibou and to pay cash (on the basis of 60% of market prices) to

the fishermen before the fish has been sold on the international market. The Government therefore has full control of export and the value of the fish in foreign currency. However the problem still exists for the fishermen in meeting the cost of vessel repairs, salaries for crew members (mostly foreigners) and provision of meals on board, most of which are paid in foreign currency. Even if there is greater benefit from the introduction of SMC, the profit could be increased by solving the fishermen's problems in respect of repairs, meals and crew costs.

The central objectives of marketing are to sell as quickly as possible at the best possible prices, in the process ensuring that fishermen earn more than they spend. The programme of action will also contribute to the overall aim of national self-reliance in food production and to food security.

The following approach can be helpful in achieving the national objectives:

47 Information on the market situation and trends should be dynamic and constantly available, to help reduce unfavourable effects through unforeseen fluctuations in the market, thus contributing to a climate of general confidence and security in fish trading.

48 Growth in inter-regional trade in fish and fishery products between regional states including Congo, Zaire, Togo, Mali, Burkina Faso, etc., which are potential markets for Mauritanian fish, and which might further encourage the exchange of products between those countries and Mauritania.

49 The possibility of increasing fish product consumption in order to protect domestic animal stocks, which are strongly affected by the Sahel dryness. Attention would be given to the marketing of acceptable low-cost fish products, particularly from small pelagic species, as well as to improving marketing facilities. Steps would also be taken to promote fishery products such as smoked fish and/or salted fish; to educate the consumer in their use and preparation in order to enhance nutritional standards.

50 The information generated by the regional fish marketing information services, and the system of international fish market indicators, will assist financing agencies and national banks in providing investment opportunities and in the preparation and appraisal of investment projects.

51 It is evident to ask the question of the priorities after reading my recommendations, as they are not settled in order. However the role and organization of the central department is very important and I would point out that the achievement of a strong and adequate organization is of greatest relevance in the successful conduct of the wide scope of the maritime administration.

G Proposal for the organization of the Ministry

The organization of the Ministry of Fisheries and Maritime Economy has been described in Chapter III F.

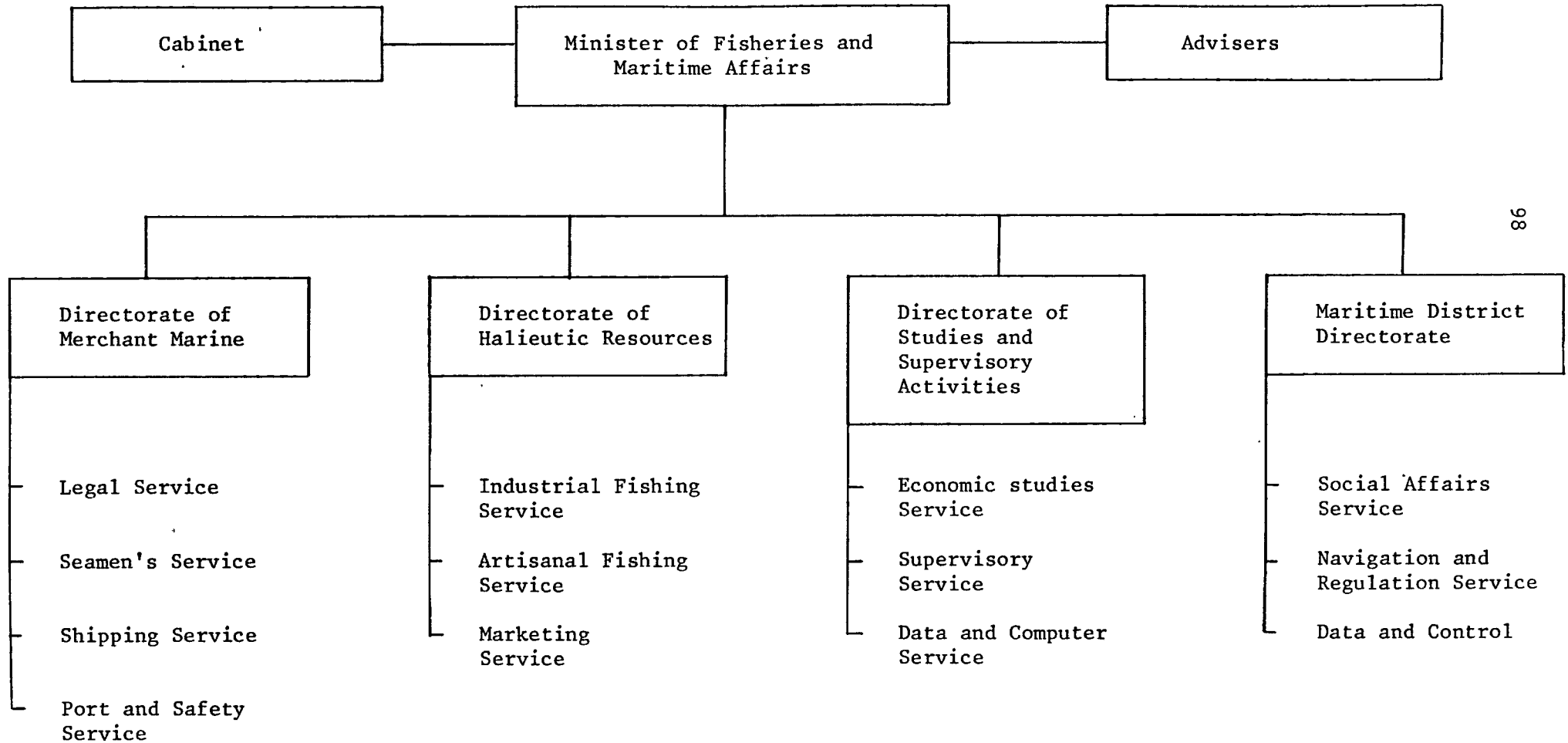
From this organization, some remarks can be derived:

- There is a lack of adjustment of responsibilities among the Directorate which can be a source of conflict of responsibilities, which can affect the operation of the administration itself.
- The Minister of this Department, bearing in mind political considerations among the maritime administration, needs to have a limited number of directors as interlocutors, and they must have real skill in the fields of their responsibility.
- In any administration covering several areas of responsibility, there are financial implications for job motivation of the different responsible officials. In the case of Mauritania, where the country is faced with economic problems, it is inadvisable to have a very heavy and complicated organization.
- At the present time, the problem of personnel still exists, therefore, the organization should be based on the potential of the personnel and the appointment of unqualified persons, particularly in the technical and/or other complex departments.

On the following page is the proposed organizational chart for the Ministry of Fisheries and Maritime Economy. I have not aimed to disregard the present organization, as all facets of the existing structure are taken into account, but particularly to propose a simple way in which the Minister can have an easy and clear supervisory role.

Ministry of Fisheries and Maritime Affairs

Proposed organization



CONCLUSIONS

Perhaps the most important aspect of the ocean resources is the living resources: they are a source of food, of foreign exchange, of employment and of national industrialization. However the ocean can also provide many other facilities of development: minerals resources, maritime transportation, etc. For the time being, however, with increasing concern over world protein shortages, society has the right to expect better use of living resources of the sea. While intervention of some kind is required to prevent an open-access fishery from devouring itself, intervention has been remarkably unsuccessful in achieving economic gains. Monitoring, control and surveillance is the bottleneck for protecting the resource against piracy of foreign fishermen.

In any industry policies are formulated, and followed by plans and programmes. In the fishery, which is very complex compared to other non-renewable resources, development of planning is fundamental for many reasons outlined in this paper.

The principal need of any fisheries management program is a clear set of well-defined objectives that everyone in the fishing industry clearly understands. The absence of well-defined objectives gives rise to confusion as to the

kind of regulations needed for proper and effective management.

A fishing industry with well-defined objectives will enable the national and local authorities to adopt proper regulations. CNROP will be able to collect the right kind of data to support management efforts. Fishermen themselves will then be in a better position to understand all regulations and support all management programmes, because it is well known that "the evil that men do lives after them".

It is possible to adopt various objectives for the fishing industry: maximum sustainable yield, maximum economic yield, maximum employment opportunities, maximum production of exports, maximum production and animal proteins, maximum efficiency of fishermen. The new fishing policy, adopted in 1978, covers most of them in the sense of impact. There is only the urgent need of improvement of management and development of planning.

My hope, and the hope of all the nation and the Government, is that we can believe in ourselves and believe in and use wisely and to maximum advantage the resources which this El Dorado sea offers us.

* GLOSSARYEconomic optimum yield

A general definition of economic optimum yield (EOY) is that it is the value of the greatest difference between the costs of inputs and the value of the outputs (catch). It occurs at that level of output where the marginal value of the catch is equal to the marginal cost of harvesting the fish. If the price of the fish varies with the output landed, EOY will occur at the point where the sum of profit to the industry and consumer surplus is maximized. It should be noted that it is the marginal cost and marginal revenue to the fisherman, and not necessarily to society, that is generally used in defining EOY. The economic optimum yield is usually attained at a physical level less than the maximum sustainable physical level, and will be taken with less fishing. It must be noted that some authors, for example Anderson (1977), use the term maximum economic yield (MEY) which is interchangeable with EOY.

Cephalopod

Any of a class of molluscs including squid, octopus, cuttlefish with prehensile tentacles around the mouth and usually with no shell.

Artisanal fisheries

Traditional fisheries which use simple fishing vessels and equipment, i.e. small-scale fishing methods. Such fisheries employ most of the world's fishermen.

Crustacean

Large class of arthropods, mainly aquatic, including crabs, lobsters, barnacles, shrimps and water fleas.

Demersal

Refers to fish that live on, or adjacent to, the sea bottom.

Industrial fisheries

Large-scale fisheries in which the catch is used for purposes other than human consumption, e.g. animal feed. These account for approximately one-third of the world's commercial catch, and consist mainly of shoaling pelagic fish.

Maximum sustainable yield (MSY)

Is the greatest yield that can be removed each year without impairing the capacity of the resource to renew itself.

Because of natural variations in stock abundance, MSY is often considered to be maximum yield available for harvesting under average natural conditions. MSY has been used as a reference point for management purposes to describe the maximum potential productivity of a stock in terms of catch and is usually associated with an exploitation rate F_{msy} that is required to hold the stock at that level of productivity (ACMRR 1980). It may, in some instances be useful to make a distinction between MSY and MSY per recruit and the respective exploitation rates F_{msy} and F_{max} . F_{msy} is that fishing mortality rate at which the average long-

term catch from a fish stock as a whole is greatest, while F_{\max} is that fishing mortality rate at which the average catch per recruit is at a maximum. In the absence of detailed knowledge of the recruitment-spawning stock size relationship (or any knowledge of underlying factors influencing annual recruitment levels), F_{msy} and F_{\max} estimates cannot be distinguished from one another.

A major problem of MSY has been the almost blind acceptance of estimates of MSY. All too frequently, fishery managers have relied heavily on estimates of the MSY for a particular stock without taking into account the assumptions made to reach those estimates. Furthermore, MSY is often erroneously viewed as a static point when in fact MSY is as dynamic in nature as the fish populations it seeks to estimate.

This notion has been eroded considerably. Although the ICNT continues to adhere to MSY as the biological basis for the management of living marine resources, it also provides that MSY be qualified (i.e. in some instances modified) by relevant social, economic and environmental factors.

(See theory of J.A. Gulland

Pelagic

Relating to communities of marine organisms that belong to the open sea, living free from direct dependence on the sea bottom or shore (the top 70 fathoms of the ocean).

Sustainable yield

Under constant environmental conditions yield can be defined as the level of catch where the population neither increases nor decreases; this level of catch can be maintained on a perpetual basis. Thus sustainable yield is obtained by adhering to some fixed fishing mortality rate.

In practice, with a variable environment, even if the fishing mortality is kept at the level sustained over time, the amount of fish available for exploitation will not always be the same. The stocks may vary in abundance from year to year in response to a variety of changing factors.

A concept related to sustainable yield is that of replacement yield as set out by Gulland and Boerema (1973).

Replacement yield, used primarily with respect to what populations, especially those experiencing changes in abundance, is that catch which if taken will leave the abundance of the exploitable part of the population at the same level at the end of the year as at the beginning - for a particular year. This final point is critical as there is no concept of continuity inherent in replacement yield.

Glossary

In part to be familiarized with the technical words throughout my paper, which is made by the use of the bibliography stated in the last page.

ABBREVIATIONS

SNIM	Société Nationale des Industries Minières
IMAPEC	Industries Mauritanienne des Pêches
COMACOP	Compagnie Mauritano/Coréenne des Pêches
MAFCO	Mauritanian Fishing Company
SOFRIMA	Société frigorifique Mauritanienne
MSP	Mauritano-Scandinave des Pêches
JTL	Joint Trawler Company
SIMAR	Société Mauritano-Roumanie d'Armement
MAUSOV	Société Mauritano-Sovietique
ALMAP	Société Mauritano Algérienne des Pêches
SALIMAUREN	Société Mauritano-Libienne
SIPECO	Société Mauritano-Nigériane
SMEF	Société Mauritanienne d'Entrepôt frigorifique
FRANSOV	Franco-Sovietique
SOURIFLOT	Flotte Sovietique
COMAR	Compagnie Mauritanienne d'Armement
COOPCADIZ	Coopérative Cadiz
FARIM	Société d'Armement de Mauritanie
PARIMCO	Mauritano-Coréenne Compagnie
MCS	Monitoring, control, surveillance
CNROP	Centre National de Recherche océanographique et des Pêches
BCM	Banque Centrale de Mauritanie
CFPM	Centre de formulation professionnelle maritime
SMC	Société Mauritanienne de Commercialisation
MPEM	Ministère des Pêches et de l'Economie maritime

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