



# REGIONAL SEAS

UNITED NATIONS ENVIRONMENT PROGRAMME

## *Coastal and marine environmental problems of Somalia*

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IMO



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## PREFACE

In 1984 the Government of the Democratic Republic of Somalia approached the Executive Director of UNEP with a request for assistance in assessing the coastal and marine environmental problems of the country and in drawing up a national action plan for the protection, management and development of its marine and coastal environment.

In response to this request and in close co-operation with the relevant national authorities a multidisciplinary mission was organized by UNEP in collaboration with ESCWA, FAO, UNESCO, IMO, IAEA and IUCN. The terms of reference of the mission specifically included consideration of problems related to:

- contingency planning for marine pollution emergencies, including incidents within ports and port generated pollution;
- development of national capabilities for the monitoring and control of marine pollution through training of staff and acquisition of equipment; and
- development of national legislation for the protection and management of marine and coastal environments.

The eight members of the mission visited Somalia from 11 to 25 June 1986 and based on the mission's findings this document has been prepared.

The draft of the document has been presented during the Seminar on Coastal and Marine Environmental Problems of Somalia (Mogadishu, 7 - 8 September 1987), attended by high level national experts, and administrators and policy-makers, as well as high officials and experts of UNEP. The Seminar, chaired by Hon. Musse Noor Amin, Permanent Secretary of the Ministry of Marine Transport and Ports of Somalia, reviewed the document and endorsed it with minor amendments reflected in this publication.

The document consists of a summary report on the coastal and marine environmental problems of Somalia, of an action plan proposed for the protection, management and development of the marine and coastal environment of Somalia and of seven sectoral reports on which the summary report is based. In preparing the proposal for the national action plan, Somalia's participation in the UNEP sponsored Action Plans for the Protection and Development of the Marine and Coastal Environment of the Red Sea and Gulf of Aden and for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region was specifically kept in mind.

The contribution of Messrs S.K. El-Wakeel (mission leader), S.W. Fowler (marine pollution), A. Hamza (marine pollution from landbased sources), S.L. Ross (oil and chemical spills), T. Stromme (marine living resources), D. Elder (protected areas and reserves), P. Burbridge (coastal area development and management) and J.C. Sainlos (environmental legislation) as members of the mission towards the preparation of this document is gratefully acknowledged. The assistance of the national authorities and counterparts of Somalia as well as of the UNDP office in Mogadishu were essential for the successful completion of the mission's task.

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## A. COASTAL AND MARINE ENVIRONMENTAL PROBLEMS OF SOMALIA

### 1. MAJOR PROBLEMS AND ISSUES CONCERNING THE SUSTAINABLE USE OF MARINE AND COASTAL RESOURCES

#### 1.1 Marine Pollution

Pollution of the marine environment is limited and does not currently pose a serious threat to the economy of Somalia. Deballasting and tank cleaning operations by tankers represent the only significant forms of oil pollution. The location of major tanker routes well offshore results in oil residues found in inshore areas being highly weathered. Due to seasonal variations in ocean currents it is most likely that the concentration of oil residues along the coast will be highest during the northeast monsoon season. A survey of the southern coast conducted during the mission indicated that oil residues in the form of tar balls compare favourably with other areas within the region.

This form of oil pollution represents an international problem whose solution lies in the enforcement of international regulations relating to the prevention of the pollution by ships in particular tanker deballasting and cleaning operations. The ratification and implementation of the Marpol Convention (1974/1978) by Somalia and neighbouring countries and concerted regional action would be of direct assistance in reducing oil related marine pollution.

Offshore oil exploration and production is not taking place at present and future exploration for oil will most likely be located well inland in the northern regions of the country. Oil related development in the continental shelf area of Somalia will not therefore be likely to pose a hazard to the marine environment.

The frequency of tanker movements within the region does, however, pose a threat in form of a major offshore oil spill in the event of a tanker accident. The risk of a major oil spill resulting from a tanker accident in the routes well offshore is low, however there is a relatively greater risk of a spill resulting from a collision or grounding from tankers delivering oil to Somali ports. Although the risk of a major oil spill might be low, the consequences could be very serious. Several of the coastal and marine ecosystems which support economically significant activities such as fisheries are very vulnerable to oil pollution. Oil related damage to mangrove, coral reefs or seagrass beds could have a serious and long lasting impact on fish stocks.

#### 1.2 Land Based Sources of Pollution

Land based sources of pollution do not represent a major threat to the marine environment at this time. However, several forms of land-based pollution pose a threat to human health and detract from the quality of the marine environment close to major coastal settlements. The main sources of potentially serious pollution are discussed in the following paragraphs.

##### Industrial Sources

Industrial development is limited and the majority of Somalia's installed manufacturing plants is located within the urban centres in the southern coastal zone. Manufacturing employs some 15,000 people, however, capital formation is relatively low and most plants are operating at chronically low rates of their installed capacity. Production is often limited due to shortages of raw materials, spare parts and fuel. However, the direct discharge of industrial and municipal wastes into the sea forms a significant threat to coastal and marine environments adjacent to the main urban centres including Mogadishu, Kismayo, and Brava.

Industrial wastes discharged along the shore or directly into the sea were estimated by the mission based upon the following categories:

(a) Liquid effluents in kg/day are BOD 1306, COD 2628, SS 1343, Grease 578, Phenol 0.06 and Ammonia 9.5;

(b) Solid wastes 5950 kg/day; and

(c) Air emissions of: particulates 120,500 kg a day  
SO<sub>2</sub> 270 kg a day  
NO<sub>2</sub> 300 kg a day

While these loads may be relatively small in terms of the total marine and coastal environment, they do represent significant amounts in respect to the highly concentrated location of industry in the southern coastal zone about the settlements of Mogadishu, Kismayo and Brava.

Only the tanning factories deliver significant input of toxic materials to the marine environment. Calculations for two tanneries at Brava and Kismayo indicate that as much as 18 to 30 kg of chromium may be dumped into the sea per day. However, measurements of the levels of such heavy metals and other toxic materials in industrial effluents and in the coastal environment do not exist. It is therefore impossible to accurately assess the extent and influence of such industrial pollution in the marine environment.

#### Municipal Sources

Domestic sewage is an important source of pollution in coastal waters adjacent to major population centres. Urban solid waste dumps also form a potential source of local coastal pollution. The leaching of materials from dumps adjacent to the sea during periods of heavy rain poses a serious potential hazard. In the absence of arrangements to monitor sewage and drainage effluents at their source or in the sea, it is impossible to construct reliable estimates of pathogenic organisms or toxic leachates entering coastal waters near urban centres.

#### Agricultural Sources

Agricultural wastes may also represent a significant form of marine pollution in the southern coastal waters. Most of the arable land lies in the Scebelle and Juba river basins. The Juba is the only river which regularly flows to the sea throughout the 3,300 km of Somalia's coastline. The Scebelle occasionally flows to the sea by joining the Juba system near the coast. Therefore, any agricultural chemicals used within the drainage systems of those two rivers may enter the coastal and marine environment adjacent to the mouth of the Juba.

Despite the widespread use of pesticides, including DDT and other persistent agricultural chemicals, there is no policy to prevent or control the use of hazardous agricultural materials and there is no programme to monitor and assess their effect upon coastal waters or the riverine systems feeding them. The only data available on such chemicals concerns pesticide residues in selected fish collected in the Mogadishu area in 1985. This data was collected as a result of the grounding of the M.V. Ariadne and the release of pesticides into the harbour. Although the concentrations of materials such as Lindane and DDT in the fish do not suggest local contamination, the results can in no way be used to assess the presence of agricultural chemicals in coastal or marine environments associated with the major agricultural regions to the South.

Other forms of marine pollution result from agricultural practices. Two specific examples are increased siltation in coastal waters due to erosion of coastal soils and sand dunes resulting from overgrazing, and the deposition of animal wastes from livestock exporting sites at harbours, or from coastal abattoirs.

### Mining and Quarrying

Siltation can also result from beach sand mining and from quarrying for limestone adjacent to the coast. Such disturbance to coastal landforms also poses the threat of erosion and further destabilization of coastal sand dunes. The impact of increased silt loads upon coral reef systems can be very severe and can significantly reduce their ability to support fish stocks.

### 1.3 Living Marine Resources

The arid to semi-arid nature of the Somali climate results in limited and highly variable flows of nutrients from land-based sources to the marine environment. This contributes to the generally low levels of primary productivity of the continental shelf on the north coast and southern east coast.

The monsoonal regime also has a direct bearing on primary production. The southwest monsoon generates upwelling of cold, nutrient rich waters which spread into the waters along the northeast coast, primarily between Ras Maber and Ras Hafun from May to August. This upwelling can be highly variable and can create extreme variations in the marine environment and its ability to support living marine resources. Nevertheless this region belongs to the richest in the world in terms of primary production.

While it is reasonable to assume that the highest densities of both demersal and pelagic fish stocks will be found in the upwelling enriched waters of northeast Somalia, the limited survey data available for demersal fish stocks throughout the continental shelf area presents a serious difficulty in the estimation of sustainable levels of exploitation.

Coral reef fish species form the basis for a major part of the fisheries production in southern Somalia. However, there are no definitive surveys of either the coral ecosystems or the stocks of fin fish and shellfish they support.

At this time fishing activities appear to be within the limits of what the resources can sustain. However, there is a danger that longer term development plans may lead to severe over-exploitation of demersal fish stocks and, perhaps, reef lobsters. Many of the current and proposed fishery projects are highly dependent upon inshore fish stocks, however the majority of the available data relates to offshore stocks. There is a lack of reliable information on the abundance of demersal stocks in inshore areas and the information which is available indicates that the level of the demersal resources might be lower than expected. Projects may therefore be planned based upon inadequate information.

Information concerning other living marine resources is extremely limited. The coastal environments of Somalia contain habitats for three endangered marine species, the Green Turtle, Hawksbill Turtle and Dugong. Although none of these species appear to be directly hunted, turtles are caught as a byproduct of fishing activity. Due to the large numbers caught, there is reason to suggest that marine turtles may be being overexploited.

Apart from concerns over demersal fish stocks, turtles and lobsters, there are currently no major problems associated with the marine environment or the sustained production of marine resources.

### 1.4 The Impact of Land-Based Activities on Coastal Land and Water Resources

The management of land based activities has a significant influence on the marine environment. In comparison to the future development of marine fisheries and oil related activities, the expansion of urban centres and the development of agriculture and industry will most likely form the most significant influences on the quality of marine and coastal resource systems and their ability to sustain development.

When land based activities are examined in terms of their impact upon coastal land and water resources, it is clear that there are major problems which, if unresolved, will undermine the ability of coastal and marine resources to meet the development needs of the Somali people. A series of problems exist which will have to be overcome in order to allow coastal land and water resources to fulfill their potential for sustainable development. These include:

- (a) environmental damage and hazards to human health resulting from the discharge of untreated industrial and domestic wastes;
- (b) insufficient standards of design in projects located within fragile coastal environments - an example being inadequate drainage arrangements for roads built in sand dune areas which have led to massive erosion, increased silt loads entering the sea and destabilization of dunes;
- (c) inadequate environmental assessments which do not provide information on appropriate locations and mixes of development - the new abattoir constructed adjacent to the municipal dump and in close proximity to the Lido beach in Mogadishu is a prime example;
- (d) lack of emphasis given to multiple-use opportunities provided by most coastal and marine resource systems, this is linked to (e);
- (e) lack of coordination between agencies. Agencies normally plan for the development of land and water resources based upon single purpose, exclusive use - for example, mining and quarrying close to the active wave zone precludes other uses and is leading to severe erosion, destruction of beaches and sand dune destabilization. This seriously threatens the development of agriculture, tourism, land and sea transport and urban development;
- (f) the need to improve technical and administrative skills of people responsible for managing coastal land and water systems;
- (g) poorly developed environmental legislation which is inadequate for the promotion of improved environmental assessment, resource allocation and management and the protection of fragile environments; and
- (h) the need to enhance public awareness of the significance of marine and coastal resources in supporting national economic and social development objectives.

The resolution of these problems requires a broader perspective on resource management than can be provided by primarily focussing upon the marine environment.

#### 1.5 The Significance of Improved Coastal Land and Water Resource Management

##### Concentration of Population and Development in Coastal Areas

The significance of coastal land and water resource management in Somalia is reflected in the terms of reference for the mission and each of the sectoral reports gives emphasis to the landward component of the coastal zone. A practical definition of the landward component of the coastal zone would include the sand dune systems and lower reaches of the various coastal plains including the inter-riverine flood plains of the lower Juba and Scebelle river systems. This zone helps to define areas whose management has a direct bearing upon marine systems and resources which are subject to competing and often conflicting demands which, if unresolved, can lead to loss of resource production and environmental degradation.



Within this landward component of the coastal zone we find some 30 percent of the total population, the majority of industrial activity, the major population centres, and a large proportion of the underdeveloped lands suitable for permanent cultivation. Current trends indicate high rates of population growth and migration to southern Somalia. With the limited capacity of rangelands in lower rainfall areas to absorb either increased nomadic populations or increased numbers of livestock, there will be increasing pressure on the less arid southern coastal grazing areas. There is a high probability that future agricultural development and rural settlement will focus on the lower coastal plain formed by the Juba and Scebelle rivers. Similarly, urban growth will be focussed in the major towns of the southern coast.

These factors, coupled with the current concentration of industry and commerce, suggest that the coastal areas of southern Somalia will form the focus of future development. In the northern and central regions, coastal and marine resources will also play a major role in the diversification of the economic base and in the production of food, raw materials and other essential goods and services. However, the scale and rate of coastal development in these regions will, for the foreseeable future, be of a more modest scale than in southern Somalia.

#### Concentration of Resource Management Problems and Issues

Due to the concentration of population, settlements and industrial development in southern Somalia, the incidence and severity of coastal land and water management problems is higher than in other coastal areas. The scope and severity of problems will most likely increase as a result of the concentration of future development in this region. Priority should, therefore, be given to rectifying existing problems, such as municipal and industrial waste management, and to the improvement of coastal land and water resources planning and management in southern Somalia.

The two most pressing management issues are:

- (1) The need for improved municipal and industrial planning and management with specific attention to the following problems:
  - (a) Discharge of toxic tannery wastes to the sea at Brava and Kismayo and on land at Mogadishu. The discharges at Mogadishu are located in an area where a shallow ground water aquifer supplies domestic drinking water;
  - (b) Inadequate refuse management in settlements, especially the capital city of Mogadishu;
  - (c) Poorly developed and maintained water supply networks and low standards of water quality. In Kismayo people are receiving untreated, silt laden water from the Juba river even though a modern water treatment facility was provided by donor assistance. The facility has not been maintained;
  - (d) Housing and sanitation problems are acute in many settlements;
  - (e) Environmental monitoring is virtually non-existent and critical environmental health tests are not being carried out;
  - (f) Absence of adequate mechanisms for co-ordinating environmental management activities, for example the control of municipal waste discharges and industrial emissions or maintenance of groundwater quality; and
  - (g) Low levels of public awareness of the danger to health due to deteriorating sanitation arrangements or water quality.

(2) The increased incidence and severity of natural hazards due to inappropriate development and/or inadequate controls over resource uses. The single most important hazard is the destabilization of coastal sand dunes. There are some 465,000 ha of formerly stable dunes which have been reactivated in coastal areas. The size of the area is less disturbing than the accelerating rate at which active dunes appear. Moving dunes pose a threat to communications, agricultural land and settlements.

## 2. MAIN FINDINGS AND RECOMMENDATIONS

The interdisciplinary nature of the mission allowed a series of complementary recommendations to be formulated which will help to promote improved coastal and marine resource planning and management. These recommendations are grouped into four basic categories; namely, 2.1) Environmental Assessment, 2.2) Resource Management, 2.3) Environmental Legislation, and 2.4) Manpower Development.

### 2.1 Environmental Assessment

There is a wide range of basic questions concerning the ability of Somalia's coastal and marine resources to sustain development initiatives. Nevertheless, sensitive and highly dynamic marine and coastal ecosystems are being developed for uses such as sand mining and quarrying which, if improperly managed, may drastically alter their character. In essence, major sectoral development efforts are being implemented based upon little knowledge of the systems upon which they are dependent. Some of the most important gaps in our knowledge of environmental conditions in Somalia are outlined below:

#### Assessment of Conditions in the Marine Environment

There exist no comprehensive baseline studies of marine ecosystems upon which to base assessments of the presence and effect of oil, toxic chemicals, pathogens and other forms of pollution. There is no systematic programme to monitor marine or land based sources of pollution in the marine environment.

The capacity to undertake analyses of potential pollutants is limited in Somalia due to a shortage of suitably qualified staff, shortage of laboratory facilities and problems associated with sampling techniques, the quality of chemicals used and analysis methodologies. In the case of the discharge of toxic materials due to the grounding of The M.V. Ariadne, the measurements which have been carried out to determine chlorinated pesticide concentrations in fish appear unreliable. An accurate assessment of the impact of the accident on the environment cannot be made at this time.

Domestic waste discharges are an important source of pollution in coastal waters near major population centres, however no sector of the government is monitoring the sources or the resulting conditions in coastal waters. Without measurements there is no way to reliably estimate the levels of pathogenic organisms entering or already present in coastal waters. The discharge of raw sewage into the sea in the heavily populated area around Mogadishu most certainly poses a health hazard. However, in the absence of any data on the types of pathogens in nearshore waters, it is not possible to draw conclusions which would help to define the risk to human health and to give weight to proposals to invest in sewerage facilities.

It is recommended that a marine pollution monitoring network be established to monitor critical areas where sustainable resource use or human health may be endangered by current sources of pollution. Three areas are identified as primary focii of the network - Mogadishu, Kismayo and Berbera.

### Assessment of Conditions in the Coastal Environment

Due to the absence of a comprehensive monitoring programme it is not possible to assess the effects of industrial, municipal or agricultural materials in the coastal environment. While there are periodic measurements of the level of faecal coliform in drinking water, existing environmental monitoring efforts are limited in scope and the absence of information on sources and levels of pollutants obscures any real assessment of environmental quality. As in the case of the assessment of marine pollution, the severe shortage of technical information on levels and sources of pollutants, shortage of skilled analysts and laboratory technicians and a general shortage of monitoring and analysis equipment undermines attempts to monitor environmental conditions.

The discharge of tannery wastes on land poses the most serious pollution hazard within the coastal environment and it is likely that toxic effluent may have already seeped into the groundwater supply in Mogadishu. Wells in the area must be monitored promptly to assess the levels of toxic materials such as chromium and the risk they pose to human health.

### Inventory, Description and Stock Assessments of Marine Living Resources

The fishery surveys and stock assessments available provide sufficient information to manage the resources of small pelagic fish, while information is lacking to assess the optimum harvest level for the demersal fish stocks, the sharks and the lobster. Information is especially scarce from the nearshore coastal resource systems which are essential to the development of economic activities such as artisanal fishing. For example, there are no comprehensive studies of coral reefs, the fish stocks they support or their ability to sustain tourism or the harvesting of semi-precious shells. Little is known of the areal extent and species composition of mangrove or of the use of mangrove products. There are no detailed surveys of marine or coastal ecosystems upon which to base management guidelines for endangered species.

It is recommended that the Ministry of Fisheries work out a national plan for research on marine living resources and the marine and coastal ecosystems which support them, specifying which tasks can be covered by the various institutions including the research arm of the Ministry, the various fishery projects, FAO, UNESCO, UNEP, IUCN and through bilateral agreements.

### Linkages between Ecosystems

The effects of pollution or harvesting pressure upon marine and coastal resource systems is also very difficult to assess. In addition, little is known of the linkages between coastal ecosystems. Obvious linkages such as flooding in the lower coastal plains of the Juba and Scabelle rivers resulting from upstream land use development are recognized. However, improved land and water management of upland areas is not generally seen as a means of improving the economic viability of flood affected activities in the coastal zone. Management of the Juba river system was never discussed with the mission, by any of the Somali officials in terms of changes in hydrologic cycles, agricultural chemical wastes or sedimentation affecting coastal and marine resources such as the shrimp fishery in the Juba delta.

### The Ability of Marine and Coastal Resources System to Sustain Development

Based upon an improved understanding of coastal ecosystems and their linkages with inland and marine areas, the ability of marine and coastal resource systems to support different forms and intensities of development needs to be defined. Specific topics which need to be addressed are:

- (a) sustained fisheries development of inshore fish, shrimp and lobster stocks;

- (b) the application of extended environmental assessment (ecological, economic and socio-cultural evaluations) of livestock grazing in coastal sand dune areas to determine acceptable means of regulating grazing pressure;
- (c) limestone quarrying and sand mining in areas adjacent to the sea;
- (d) conservation of coral reefs to prevent coastal erosion from wave activity and the subsequent destabilization of coastal sand dunes;
- (e) carrying capacity of coral reefs and beaches in terms of potential tourism development;
- (f) critical coastal and marine habitats and ecosystems need to be identified in terms of their economic and social significance to the Somali people, their international significance in relation to the conservation of endangered species and their susceptibility to different forms of marine pollution; and
- (g) risks and hazards associated with the exploitation of different resource systems need to be identified and assessed.

A major function of environmental assessment is to provide a synthesis of different forms of data to provide information to support the formulation of policies and the identification of management alternatives.

#### Identification of Development Alternatives

The assessment of coastal and marine resource systems also needs to be strengthened in terms of providing information on alternatives for development. Two types of alternatives need to be examined. The first relates to single purposes versus multiple-use options for the management of coastal and marine resources. For example, coral reefs can: act as a buffer to storms, serve as a mechanism for nutrient exchange, provide nursery and spawning areas for commercially valuable fish stocks and provide an attraction for tourists - all at the same time - if the uses of the reef are carefully managed.

The exposition of single versus multiple-use development options for coastal and marine resources will require more detailed information on a broader range of topics than is normally collected and analysed for a sectoral activity such as agriculture or fisheries. It requires information on: (1) the ability of individual resource systems to respond to alternative forms of development, (2) information on interactions between different forms of use, and (3) the form and level of management required to promote the desired mix of development.

The identification of single versus multiple-use options is not possible based upon current limited evaluations of the sectoral development potential of resources. It is therefore suggested that a new approach be taken to the collection and evaluation of information based upon natural resource systems, their functions and interlinkages. Instead of forestry surveys of species composition and standing stock, or the range survey of mangrove for camel fodder, more balanced and objective studies need to be conducted which do not predetermine the form or limit the scope of assessments of alternatives. We further suggest that the assessments be co-ordinated by a centralized body - such as the Ministry of National Planning and the proposed inter-agency "Environmental Coordination Committee". This would help promote a clearer understanding of the major resource systems, their ability to support development and limits to development which are related to physical factors such as soils, public investment in roads and other infrastructure, manpower skills and problems associated with current development (misallocation of resources, pollution, erosion, water shortages etc.).

### Analysis of Alternative Locations for Development Activities

The second form of alternative which needs to be addressed is the evaluation of alternative locations for projects and activities. For example, limestone and sand materials quarried for construction purposes may be found in different locations. The benefits and disbenefits to the Somali economy of quarrying these materials in beach areas versus less fragile inland environments needs to be evaluated so that options can be presented to decision makers.

The following forms of information are required to promote improved evaluations of development alternatives:

- (a) Assessments of the compatibility of different forms of resource use and determination of multiple-use opportunities which maximize the development potential of natural resource systems;
- (b) Assessment of the environment, social and economic impact of different forms and intensities of development;
- (c) Identification of improvements which could be made to existing development to improve production and reduce land or water use requirements; and
- (d) What land/water uses require coastal locations and which are not compatible with other coastal activities. These activities will require exclusive use of specific coastal areas and the trade-off associated with alternative locations should be explored.

This list can be extended. However, the theme indicated of improving environmental assessments to provide information for formulating policies and for defining option for the use of resources by looking for multiple-use opportunities, appropriate sites and alternative strategies for improving existing resource use is a key point which should be built into the Action Plan.

### 2.2 Resource Management

A series of Five Year Plans have been formulated by the Somali Government. However, due to the shortage of development capital and lack of resource information, these plans represent statements of general development goals and specific programmes are highly dependent on the foreign assistance available and the projects it is designed to promote.

There are no comprehensive national policies or national/regional or local plans for the development or allocation of marine or coastal land and water resources. Policy decisions concerning the allocation of physical resources and scarce development funds are, therefore, based upon the success of competing sectoral claims and the donor assisted projects promoted by the different agencies.

The competing, and at times conflicting, interests of different agencies can lead to disputes over the control and use of land and associated resources. Within coastal areas the problems are more acute than for marine resources due to both the concentration of population and secondary economic activities, and the lack of control over other resource based activities such as livestock grazing and sand mining.

The co-ordination and integration of development is, in theory, carried out by regional councils presided over by district commissioners and regional governors. The administrative structure of the regions and districts includes representatives of all major national ministries and agencies. In practice, the absence of policy based upon adequate resource and environmental assessments, lack of manpower skills and the heavy dependence on foreign assistance leads to a piecemeal, project by project approach to resource management and development planning.

Strengthening the coastal area management and planning capacity of the Somali Government is a prerequisite to the promotion of improved marine and coastal resource development. This will allow current problems that hinder sustainable development to be properly addressed which would, otherwise, reduce the capacity of coastal and marine resources to help meet the development needs of the Somali people.

#### Steps to Improve the Formulation of Policy and the Coordination and Integration of Development

##### Establishment of Environmental Units in Ministries and Agencies

Improvement in the formulation of development policies and the co-ordination and integration of coastal and marine resource development by sectoral agencies should be the primary resource management goal of the action plan. Two specific actions are recommended: The first is the establishment of a special unit within each agency charged with the evaluation of the environmental, economic and social implications of any proposed programme or development activity concerning coastal or marine resource systems.

##### Establishment of an Interministerial Environmental Coordination Committee Supported by a Coastal and Marine Environment Commission

The second is to support the establishment of the Interministerial Environmental Coordination Committee which has been proposed by the Somali Government. The functions of the committee would be strengthened by the establishment of a Coastal and Marine Environment Commission made up of members of those ministries and agencies which have responsibility for marine or coastal land and water resources and chaired by the permanent secretary of the Ministry of Marine Transport and Ports. The Commission would be charged with providing advice to the Interministerial Committee on technical and policy issues. The Commission would be staffed by civil servants of high technical or administrative calibre seconded by the ministries or agencies and who would provide a day to day link with their own agency's environmental unit and the Commission. The Commission would have access to all information pertinent to the management and planning of coastal and marine resources.

Once briefed by the Commission on matters which are of common concern to the respective ministries and agencies, the Interministerial Committee would formulate improved policies, assist in the resolution of conflicts and promote the co-ordination and integration of individual development initiatives.

##### The tasks of the Commission would be to:

- Act as the UNEP focal point for the regional action plans;
- Propose to the Interministerial Committee objectives for a national policy relating to the marine and coastal environment and resource management;
- Establish the framework of a national action plan and propose appropriate policies and actions to ensure its implementation;
- Study and examine draft laws and regulations (laws, decrees, directives) and make recommendations for the provision of new legal measures;
- Control the implementation by ministries of the decisions taken by the Interministerial Committee; and

- Coordinate the participation in the regional action plans by the national ministries and agencies concerned, and co-ordinate the implementation of those actions plans.

The task of the Interministerial Committee would be:

- To reduce current problems caused by intersectoral conflicts and poor standards of settlement planning and industrial development through the adoption of the objectives and actions proposed by the permanent secretariat and through the provision of the necessary resources in terms of finance and personnel.

Steps to Improve Coastal Settlement Planning and Industrial Location

Based upon the need to improve co-ordination and integration of development, steps should be taken to improve conditions within urban and rural settlements by strengthening the current process of settlement planning and industrial location through the enactment of new legislation based upon an updated and revised form of 1947 Town Planning Ordinance. This new legislation would also be used in association with the powers of the Harbour Master to improve land and water use policies and controls over coastal development. The improvement of conditions in settlements would also be strengthened by improving the co-ordination of the activities of agencies concerned with public health and the provision of services.

In the longer-term, urban and regional plans should be developed which support and strengthen the efforts of the National Planning Agency in guiding the allocation of natural resources and development funds through the use of the Five Year Plans.

Establishment of an Oil Spill Contingency Plan

An oil and chemical spill contingency plan should be established under the Ministry of Marine Transport and Ports. Training is very important in the establishment and implementation of the contingency plan and the Director of the Marine Department is identified as the key official who should receive immediate training and who should then help to develop the contingency plan based upon the draft plan and detailed recommendations provided in the sectoral report on Marine Oil and Chemical Spills and their control.

2.3 Environmental Legislation

The constitution of Somalia makes basic provision for the enactment of legislation to control activities which might endanger marine and coastal environments and their associated resources. However, specific legislation dealing with the protection of the marine and coastal environment is at a very early stage of development. There are few effective controls or performance standards, and enforcement is hampered by the absence of environmental monitoring information and adequate manpower skills. Improvements in environmental legislation will have to be backed up by: the establishment of realistic standards by which to judge the impact of pollution, strengthening and expanding environmental monitoring schemes, and technical and administrative manpower training. The legislation can then be used as a tool for reducing stress in resource systems or for reducing human health hazards from industrial pollution.

Somalia is party to very few international conventions relating to the marine and coastal environment. It would be of benefit to Somalia to ratify those conventions which could provide a framework for the enactment of national laws and for the provision of technical assistance. Although ratification of these conventions would mean that new measures would have to be taken in Somalia to meet the conditions of the conventions and protocols, the cost need not be very high. Funds are available through some of the conventions to support their implementation and facilities, such as IUCN's technical assistance programme or UNEP's "Clearing-house" mechanism,

can help organise both technical advice and financial support for projects including the establishment of marine protected areas. Specific recommendations pertaining to the improvement of environmental legislation are outlined below.

#### Ratification of International Conventions

The Government of Somalia should ratify the two Regional Seas Conventions to which it is a Party:

- The Convention for the Conservation of the Red Sea and Gulf of Aden Environment and the Protocol Concerning Regional Cooperation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency.
- The Convention for the Protection Management and Development of the Marine and Coastal Environment of the Eastern African Region and related Protocols.

#### Marine Pollution

The existing regulations concerning pollution by ships are very limited and mainly concern areas within or adjacent to ports. Somalia is a member of the International Maritime Organisation (IMO) and it would be desirable for the Government to ratify the international conventions relating to marine pollution for which the IMO acts as a depository. IMO conventions, such as MARPOL 1973 and 1978 governing ship based pollution, or SOLAS 1974 concerning maritime safety could, if ratified, provide the basis for reducing pollution or maritime hazards which increase the risk of incidents such as collisions leading to oil or chemical spills. Similarly, the Convention on the Prevention of Marine Pollution by Dumping Wastes (LDC, 1972; 1975) would, through its ratification by Somalia, provide the basis for national regulations and support from other nations.

#### Marine Pollution from Land-Based Sources

Laws and regulations to prevent or control pollution of the marine environment from land-based sources do not exist in Somalia. The UNEP guidelines on this subject would provide a valuable basis for the development of regulations, performance standards and enforcement procedures.

#### Coastal Area Management and Planning

In practice, the limit of the maritime domain in Somalia includes a 400 metre wide belt of land along the coast. Authority for control of activities within this area is vested in the National Harbourmaster's office at the Ministry of Marine Transport and Ports. However, the range of agencies with responsibility for promoting and controlling development in this landward component is very broad and steps will have to be taken to deal with urgent issues such as hazards to public health from land-based pollution which cannot be resolved by the Harbourmaster's department alone.

The Town Planning Ordinance of 1947 could be used to establish a new law which would be implemented throughout the country to bring about immediate improvements in coastal settlement planning, industrial location policy and the provision of basic services and infrastructure. It is further recommended that steps be taken to formulate a regional pilot project on coastal area management and planning in southern Somalia and to use this to help establish a mechanism for improved intersectoral coordination.



While further regulations will have to be adopted to deal with municipal and domestic sources of pollution, priority should be given to the establishment of improved coordination and integration of development efforts. It is the management framework which is most urgently needed and a pilot project may be the most effective means of creating the working arrangements for that framework and for developing new laws and regulations.

### Fisheries

New legislation (Fisheries Law No. 13, 30 Nov. 1985) has been promulgated based upon recommendation by FAO and no further legislation is recommended at this time.

### Endangered Species, Protected Areas and Reserves

Specific laws and regulations relating to the protection of endangered marine species, critical habitats or protected areas and reserves do not exist in Somalia. The Somali coastal zone provides habitats for at least 3 endangered species and the Government has signed the Eastern African Convention and its Protocols and is expected to ratify these instruments before the end of 1986. Steps will have to be taken to create laws governing the designation, establishment and management of marine protected areas and reserves once the Convention and its Protocols are ratified.

A factor which will be very important in gaining support for the protection of endangered species and critical habitats is the demonstration of the value of these features to the Somali people and to the rest of the world. The Somali Government could request assistance from IUCN to undertake a detailed inventory of coastal and marine ecosystems and to identify their economic value to Somalia and the costs involved in instituting conservation measures such as marine protected areas. While the Somali Government has signed the Eastern African Action Plan, Convention and Protocols and the June 1985 Conference of Plenipotentiaries accorded the highest priority to those elements of the Action Plan related to the conservation of species and habitats, it will be very important to demonstrate the net benefit of supporting such measures given the immediate needs of the people, the sand dune problems, and lack of basic information for management of the fisheries sector.

Priorities associated with the formulation and enactment of new legislation are presented later in this report in the proposed Somali National Action Plan.

## 2.4 Manpower Development

Manpower development must be an integral component of any action plan for Somalia. The range and technical competence of the existing manpower base are limited and education and specialized training will be required to provide a broader manpower base with the necessary skills to permit improved environmental assessments, to staff monitoring programmes and to create improved resource management and development plans. Attention will have to be given to providing people with skills which will allow sophisticated environmental information and principles to be translated into development policy and management options. Decision making skills will also have to be strengthened to allow more full use of the increasingly sophisticated environmental information which will become available.

Manpower skills which will be required are outlined below:

### Environmental Assessment

- (a) Coastal and marine resource and environmental assessment: Due to the interdisciplinary nature of coastal and marine environmental assessment, management and planning, a broad range of skills are required to provide the necessary information and then to translate it into guidelines for policy and the implementation of policy and management activities.

The following skills are representative of the range required: marine biology, zoology, botany, ecology, geomorphology, physical and chemical oceanography, fisheries biology and fish stock assessment, resource economics, sociology, wildlife conservation and interdisciplinary resource assessment. These skills will also be appropriate to the evaluation of fisheries and other living marine resources and the coastal and marine ecosystems which support them.

(b) Environmental monitoring of industrial and domestic wastes on land: Analytical skills will have to be strengthened to provide information on sources and levels of pollution. At the present time the shortage of skilled technical staff and equipment does not allow existing environmental health surveillance and monitoring programmes to be fully implemented.

(c) Assessment and monitoring of land-based marine pollution: Qualified marine biologists, ecologists and fisheries specialists will need further training to initiate the basic marine surveys necessary to make an inventory of coastal and marine ecosystems and to assess the effects of different forms of pollution. Chemical analysts currently staffing laboratories will also need advanced training in pollutant analyses.

#### Environmental and Resource Management

Resource management skills in each of the major sectoral agencies need to be strengthened. Priority however should be given to the creation of a nucleus of well trained staff to support the work of the Interministerial Commission on the Marine and Coastal Environment. Due to the shortage of skilled manpower, it is unrealistic to expect senior officials seconded to the Commission to be released for full-time training at institutions outside Somalia. For the short-term, it will be necessary to provide technical assistance and to establish training courses for professionals in Somalia. Models for such activities have been developed by UNESCO (Coastal Area Development Planning), IUCN and the United States National Park Services (Coastal Area Management and Planning; Marine Parks and Protected Areas),

In the longer term, it will be necessary to increase the number of people with specific resource management skills who are trained to work in interdisciplinary teams. Such skills would include: coastal resource management, economics, planning and administration, coastal engineering, environmental engineering, public health, urban and regional planning and environmental conservation. The majority of these skills cannot be supplied by the educational resources in Somalia, and for the foreseeable future will have to be provided through foreign training.

Reciprocal visits to other countries in the region and to other Regional Seas project areas might also be considered for both technical and administrative staff. Participation in Regional training projects providing opportunities to strengthen the skills of people with common marine and coastal problems should also be considered.

Consideration should also be given to strengthening the relevant institutions with facilities where the trained staff can work and to the establishment of a civil service college or similar administrative and management related training facility.

A basic problem which the Somali authorities face is keeping staff once they have been trained. Due to the higher salaries available elsewhere in the region, many people go abroad to work. A contractual agreement might be considered whereby people sponsored for training abroad would undertake to return to Somalia and to work within the Government environmental assessment and resource management framework for a period of five years.

**B. ACTION PLAN FOR THE PROTECTION, MANAGEMENT AND DEVELOPMENT OF THE MARINE AND COASTAL ENVIRONMENT OF SOMALIA**

**INTRODUCTION**

This Action Plan is based on:

- (a) Somalia's participation in the Action Plan for the Protection and Development of the Marine Environment of the Red Sea and Gulf of Aden;
- (b) Somalia's participation in the Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region;
- (c) Findings of the:
  - UNEP/UN/UNIDO/FAO/UNESCO/WHO/IMO/IUCN exploratory mission to the Eastern African Region (October/November 1981);
  - IMO mission to Somalia dealing with marine training (22-26 June 1980), maritime safety (23 November - 1 December 1982) and technical port operations (15-23 September 1983);
  - UNEP/ESCWA/FAO/UNESCO/IMO/IAEA/IUCN interdisciplinary mission to Somalia (11-25 June, 1986);
- (d) Results of:
  - UNEP Workshop on the Protection and Development of the East African Region (Mahé, 27-30 September 1982);
  - IMO Seminar on the Protection of the Marine Environment (Venice, 22-29 October 1984);
  - IMO Seminar on Maritime Safety, Harbour-wastes and their Role, Human Resources and Seafarers and Training (Venice, 22 April-2 May 1985); and
- (e) Results of the FAO/UNDP/NORAD project on fishery resources assessment (March 1985 - November 1986);
- (f) Review during the Seminar on Coastal and Marine Environmental Problems of Somalia (Magadishu, 2 - 8 September 1987); and
- (g) Numerous reviews, surveys and reports relevant to the Action Plan.

All components of the action plan are interdependent, and provide a framework for comprehensive action which should contribute to both the protection and the continued development of the region. No component is an end in itself. Each activity is intended to help the Government of Somalia to strengthen the process through which environmental management policies are formulated.

The general goals and objectives of this action plan for the protection and development of the marine and coastal environment are:

- (a) To promote the sustainable development and sound management of Somalia's marine and coastal resources by:

- (i) Improving the assessment of marine and coastal resources and the translation of environmental information into policy options and resource management guidelines;
  - (ii) Emphasizing the economic and social importance of the resources of the marine and coastal environment; and
  - (iii) Establishing a national framework for the coordination and integration of marine and coastal development activities;
- (b) To establish general policies and objectives and to promote appropriate legislation for the protection and development of the marine and coastal environment;
  - (c) To prevent pollution of the marine and coastal environment;
  - (d) To provide for the protection and rational development of the living marine resources through the conservation of habitats, the protection of species, and the careful planning and management of human activities that affect them;
  - (e) To strengthen and encourage, through increased national and regional collaboration, the activities of institutions involved in the study of marine and coastal resources and systems;
  - (f) To improve training and assistance at all levels and in all fields relating to the protection and development of the marine and coastal environment;
  - (g) To stimulate the growth of public awareness, at all levels of society, of the value, interest, and vulnerability of the Somali marine and coastal environment.

#### ENVIRONMENTAL ASSESSMENT

There is a wide range of basic questions which need to be addressed concerning the ability of Somalia's marine and coastal resources to respond to current and proposed development initiatives. The inventory and classification of coastal and marine ecosystems is incomplete and little is known of the linkages between ecosystems. There exists a need for continuing, systematic assessment of the effects of pollution and harvesting pressures upon marine and coastal resource systems. Among the tasks that should be performed are:

- (a) Establishment of a marine pollution monitoring network which in its initial stage of development, will be set up to monitor only critical areas where pollution is expected or where valuable resources need to be protected. Three areas are identified as primary focii of the network - Mogadishu, Kismayo and Berbera. An additional "clean" site, outside the immediate influence of any source of pollution, should be selected to establish background contaminant concentrations with which to gauge pollution levels in other areas. Possible sites are located 500km north of Mogadishu at Obbia or at Ras Hafun.
- (b) Establishment of an environmental monitoring programme to assess municipal and industrial pollution in the coastal environment. A phased programme should be established which would focus initially upon sanitation, leachates from solid waste disposal sites and industrial effluents and their effects upon groundwater supplies and hazards to public health adjacent to major coastal settlements. Later stages in the development of the programme would establish a national monitoring capability and may involve water, air, stream and marine water quality, food hygiene, control of vectors of disease, pesticide and other agricultural chemical use and advanced analyses of municipal and industrial waste products.

- (c) Undertake an inventory of coastal and marine ecosystems including their functions and the linkages between different systems. This inventory should be complemented by an assessment of the presence and distribution of marine mammals which depend upon Somali coastal ecosystem for part of their life cycle. This information would form the baseline data to be used in assessing the possible effects of various types of land and marine based pollution in respect to the natural health and condition of the ecosystems. The baseline data would also form the foundation for defining resource development opportunities supported by the natural functions of coastal and marine ecosystems. It would serve as the basis for developing management strategies to promote resource development, to control uses and to conserve fragile areas or habitats essential to the conservation of marine mammals and endangered species.
- (d) Collect and critically evaluate data on demersal and pelagic fish stocks, reef based populations, marine mammals, marine turtles and molluscs to determine sustainable levels of harvest.
- (e) Undertake an inventory of current forms and intensities of marine and coastal resource use and assess these uses in respect to the sustainable levels of production of resource systems. This information would form the basis for identifying resource production opportunities, relevant management guidelines to maximize multiple-use options and to formulate appropriate development policies.
- (f) Identify and assess specific management problems in marine and coastal areas which reduce their capacity to meet the development needs of the Somali people. The assessment should include an evaluation of natural hazards and risks.
- (g) Apply extended environmental assessment (ecological, economic, and socio-cultural evaluations) to problems, such as overgrazing by livestock in coastal sand dune areas or marine pollution, to determine management solutions which are appropriate for Somalia.
- (h) Use environmental assessment to identify opportunities for alternative locations for projects and activities. Assessments should address the following considerations:
  - the compatibility of different forms of resource use;
  - the environmental, social and economic impact of proposed activities in terms of alternative locations and interactions with other coastal or marine activities;
  - identification of modifications to projects to ameliorate potential negative impacts and to improve the efficiency of resource use; and
  - identification of activities which require coastal locations which are not compatible with other uses and which require exclusive use of specific areas or access to resources.

#### ENVIRONMENTAL MANAGEMENT

The key to sustainable, environmentally sound development is wise management of the resource base. Such management should take into account the capacity of natural resource systems to support development activities, the development goals of the Somali Government, and the economic and socio-cultural feasibility of their implementation. The following activities should be undertaken to strengthen the resource management abilities of the Government and the formulation of appropriate environmental management policies:

- (a) The primary environmental and resource management goal of the action plan should be to improve the coordination and integration of coastal and marine resource development by ministries or agencies. Three specific actions are:

- (i) encourage the formation of a Technical Advisory Group on coastal and marine resource development made up of professional staff drawn from the ministries of: Marine Transport and Ports; Livestock, Forestry and Range; Agriculture; Commerce and Trade; Minerals and Water Resources; Finance; National Planning; Fisheries; and the Water Development and Coastal Development Agency. The Technical Advisory Group would form the nucleus for the longer-term establishment of a Marine and Coastal Environment Commission as outlined below (ii);
- (ii) support the establishment of the Inter-Ministerial Environmental Coordination Committee which has been proposed by the Somali Government supported by the establishment of a Marine and Coastal Environment Commission made up of members of the relevant sectoral ministries and agencies and chaired by the Permanent Secretary of the Ministry of Marine Transport and Ports. The commission would provide advice to the Interministerial Coordination Committee on technical and policy issues and would provide a day to day link between sectoral agencies; and
- (iii) a longer term objective is the establishment of a special unit within each of the ministries or agencies which would be responsible for the evaluation of the environmental, economic and social implications of any proposed programme or development activity concerning marine or coastal resource systems.

The task of the proposed Marine and Coastal Environment Commission would be:

- Act as UNEP focal point for the regional action plans;
  - Propose to the Interministerial Committee objectives for a national policy relating to marine environment and coastal area management;
  - Establish the detailed framework of the national action plan and propose actions for its implementation;
  - Study and examine draft laws and regulations (laws, decrees, directives) and make recommendations for the provision of new legal measures;
  - Control the implementation by ministries of the decisions taken by the Interministerial Committee;
  - Coordinate the participation in the regional action plans by ministries and agencies and coordinate the implementation of measures taken in Somalia under those action plans.
- (b) Revise and update the former 1947 Town Planning Ordinance as the basis for the enactment of new legislation to be used as a tool for strengthening the planning and management of settlements. Provision would be made for the creation of adequate infrastructure and the supply of basic services and for improved industrial siting.
  - (c) Establish an oil and chemical spill contingency plan. Responsibility for establishing and implementing the plan would rest with the Ministry of Marine Transport and Ports.
  - (d) Formulate appropriate guidelines and standards to prevent, reduce and control the disposal of industrial, municipal and agricultural wastes into coastal and marine environments. Guidelines and principles governing the treatment and discharge of existing wastes should be formulated as well as the specification of performance standards for new development.
  - (e) Establish a regional pilot project on coastal area management and planning in southern Somalia which can be used to help develop improved environmental assessment, environmental management and appropriate legislation.

- (f) Prepare a national action plan for the establishment of marine and coastal protected areas. Priority should be given to establishing a management plan for the coral island-reef-mangrove system south of Kismayo.

#### ENVIRONMENTAL LEGISLATION

Existing legislation and regulations pertaining to the protection and sustained use of coastal and marine resources should be reviewed, updated, strengthened and expanded. Criteria and performance standards will need to be established to form the base for the improved enforcement of policies and regulations dealing with coastal land and water resource management, the marine environment and the conservation of marine living resources. The following activities are appropriate.

- (a) Establish the legal foundations for the proposed Interministerial Environmental Coordination Committee, the Marine and Coastal Environment Commission and the environmental units within the relevant ministries and agencies;
- (b) Develop laws and regulations to prevent or control pollution of coastal and marine environments from both land based and marine sources. The UNEP guidelines on land based sources of pollution, the IMO conventions and guidelines and technical assistance from WHO and UNIDO would form appropriate bases for new legislation, regulations and performance standards;
- (c) Enact new legislation based upon a revised and updated version of the 1947 Town Planning Ordinance;
- (d) Following the establishment of a regional pilot project on coastal area management and planning, new legislation should be developed where necessary to strengthen inter-sectoral coordination and the realization of national goals and objectives.
- (e) Laws and regulations governing the designations, establishment and management of marine protected areas and reserves will be required once Somalia ratifies the 1985 Eastern African Convention.

Somalia should consider the early ratification of the following Conventions as a basis for the formulation of appropriate national legislation, regulations and guidelines which support the sustained management of marine and coastal resources. These are:

- (a) The Regional Seas conventions:
  - The Convention for the Conservation of the Red Sea and Gulf of Aden Environment and the Protocol Concerning Regional Cooperation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency.
  - The Convention for the Protection Management and Development of the Marine and Coastal Environment of the Eastern African Region and Related Protocols.
- (b) International conventions relating to marine pollution of which IMO is the depositary:
  - MARPOL 1973/78
  - COLREG 1972
  - SOLAS 1974
  - CLC 1969 and Protocol 1984
  - FUND 1971 and Protocol 1984
  - Conventions relating to intervention on the high seas in cases of pollution (Convention 1969 and Protocol 1973)
  - London Dumping Convention 1972
  - Load Lines Convention 1966
  - Tonnage Convention 1969

(c) Conventions dealing with conservation of living resources:

- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973);
- The Convention on the Conservation of Migratory Species of Wild Animals (Bonn 1974);
- The Convention on Wetlands of International Importance Especially as Water Fowl Habitats (Ramsar 1971).

Technical assistance and advice on the drafting of national legislation to ensure the effective implementation of measures to protect coastal and marine environments and to promote the sustained utilization of resources should be requested from international agencies including: FAO, UNEP, IMO, IUCN, UNESCO, UNIDO, UN HABITAT and UNSO.

MANPOWER DEVELOPMENT

Strengthening the skills of the manpower base must be an integral part of any efforts to improve the assessment, management and planning of coastal and marine resources. Priority should be given to training a nucleus of well qualified, senior civil servants and officials who will play key roles in the promotion of improved inter-sectoral coordination and the integration of development efforts.

Action must also be taken to increase the number of people with skills in the following areas:

- (a) Environmental Assessment. The first priority is to strengthen technical and analytical skills to support programmes to identify the sources and to monitor and assess the impact of marine and land based pollution on coastal and marine resource systems. Of equal importance is training in the inventory, classification and description of coastal and marine environments and their assessment in terms of their potential for sustainable use. Emphasis should be placed upon training people in disciplines such as marine biology or coastal geomorphology and in interdisciplinary approaches to the translation of bio-physical data into information of use in the formulation of management guidelines and policy options.
- (b) Environmental and Resource Management. Priority should be given to strengthening the skills of professional managers drawn from government agencies who will be involved in the proposed Interministerial Commission on the Marine and Coastal Environment. This could be achieved by short-term training courses in Somalia supported by technical assistance through the UNEP Regional Seas Programme.

It will be necessary to make provision for a longer-term training programme to increase the number of people with specific environmental and resource management skills such as coastal resource management, resource economics or environmental engineering. These people should also receive training in interdisciplinary approaches to problem solving and management.

Training at institutions outside Somalia will be required until such time as the educational resources in the country can be strengthened to provide the necessary courses and facilities.

Technical assistance to support short-term professional training in Somalia will help to fulfill some of the immediate manpower needs. The Regional Seas Programme and the two Conventions of which Somalia is a member provide a vehicle for establishing regional and in-country training projects. It would be very useful to examine training initiatives in coastal and marine area



management and planning supported by other UN organizations such as UNESCO, IMO and FAO and agencies such as IUCN and the US-National Park Service. The training materials prepared under these initiatives would be very useful in the formulation of requests for assistance in organizing short-term training projects in Somalia.

Measures should be taken to strengthen the relevant faculties at the National University in Somalia to support pollution monitoring and coastal and marine resource management and through encouraging cooperation with other institutions within the region.

Measures will also have to be taken to ensure that people who receive training participate fully in the new coastal and marine area management initiatives and are not siphoned off to other projects or countries able to offer higher salaries.

The expansion of the manpower base will be complemented by the progressive expansion of technical and administrative posts and the provision of funds and facilities to allow the manpower to make an effective contribution to solving current and future development problems.

#### INSTITUTIONAL AND FINANCIAL ARRANGEMENTS

The Somali Government's proposed Inter-Ministerial Committee on Environment should be put into operation through the passage of enabling legislation and the provision of a budget.

The proposed Marine and Coastal Environment Commission made up of all ministries and agencies with responsibility for coastal or marine areas will be formally established through the passage of enabling legislation and allocation of funds. The Commission would be chaired by the Permanent Secretary of the Ministry of Marine Transport and Ports. Working parties set up under the Commission to deal with specific issues and problems will be made up by representatives of relevant ministries and agencies and chaired by the most appropriate person. For example a working party on environmental health would be chaired by a representative of the concerned Ministry.

The operation of the Commission will require close working relationships with institutions which can provide specialist support, such as pesticide residue analysis by the Faculty of Organic Chemistry at the National University. Links will need to be forged with institutions within the Eastern African Region which could assist the work of the Commission.

Links should be established with international organizations to provide technical advice, equipment and financial support.

Implementation of the Action Plan will be initially dependent upon financial and technical support from outside Somalia. The ultimate aim is to make the Action Plan self-supporting through the reduction of costs associated with existing marine and coastal problems and by improving the sustainable production of resources.

Links should also be forged between national and international Non-Government Organizations, such as the Somali environmental groups and IUCN, and the Marine and Coastal Environment Commission.

#### SUPPORTING MEASURES

A national campaign to increase public awareness of the need to protect marine and coastal environments and to improve conditions in coastal settlements should be initiated.

Education in the principles of protection of marine and coastal resources should be introduced into the educational curricula at primary, secondary and university levels, through training of special instructors or specialized training of general educators. Seminars and courses should also be offered to the general public dealing with issues which require concerted public action such as the destabilization of sand dunes.

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