Integrated ocean management: a basis for sustainable development of the Nigerian marine environment

Florence Orovwuemu Akpokodje

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INTEGRATED OCEAN MANAGEMENT: A BASIS FOR SUSTAINABLE DEVELOPMENT OF THE NIGERIAN MARINE ENVIRONMENT.

AKPOKODJE, FLORENCE OROVWUEMU (MRS) THE FEDERAL REPUBLIC OF NIGERIA.

A dissertation submitted to the World Maritime University in partial fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE

in

GENERAL MARITIME ADMINISTRATION AND ENVIRONMENT PROTECTION (GMAEP).

1995
This work is dedicated to the following people who God has blessed me with:

<table>
<thead>
<tr>
<th>My Husband:</th>
<th>Mr. Christopher. O. Akpokodje</th>
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</thead>
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<tr>
<td>My Children:</td>
<td>Ario Patricia Akpokodje</td>
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<td></td>
<td>Eunice Ebowor Akpokodje</td>
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<td></td>
<td>Precious Onasimode Akpokodje</td>
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<td>My Uncle and Sister:</td>
<td>Christopher Omoyovwe Omoyine</td>
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<td>Maria Onoagharakpore Omoyine</td>
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<td>My Mothers:</td>
<td>Madam Odiyoma Ediru</td>
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<td></td>
<td>Madam Ojigbo Ekuke</td>
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<td></td>
<td>Madam F.O. Akpokodje</td>
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and I say, may God in His infinite mercy, bless and protect them all in the most blessed name of Jesus Christ (amen).
DECLARATION

I certify that all the materials in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

(Signature) [Signature]

(Date) 2016/05

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Special thanks are also due to all the visiting professors and resident professors of WMU who through their lectures and assistance in different ways have given me a lot of knowledge during my course of study in the University.

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Special acknowledgement is also made to those authors and publishers whose data and illustrations have been reproduced in this dissertation. However, the reader is reminded that any opinions and conclusions expressed herein are my own and I take full responsibility for any errors of commission or omission.
ABSTRACT

The world’s coastal areas are characterised by immense natural and anthropogenic processes. These processes always put the coast and marine environment under serious pressures. The Nigerian marine environment is no exception.

The ocean and its coastal environs have played a major role in the nation’s economy. In the past, protection have been mainly from military attacks and in most cases there was no form of protection at all. Today, the story is different as danger comes not only from military attacks but more from commercial developments and recreational activities. We need to be more vigilant because these developments could cause irretrievable damage unless carefully located and managed. The ocean is a finite resource and we must use it wisely. One of the ways of doing this is through integrated management.

This project examines the concept of Integrated Management of the marine environment as a basis for sustainable development in general and with particular reference to the Nigerian Marine Environment.

With a brief introduction to the trends affecting the marine environment, attention is then shifted to the Nigerian Marine Environment with a review of its policies for the environment, human activities affecting the ocean, application of concepts of integration in selected case studies and a look into objectives and priorities for Integrated Ocean Management. Finally, the means to improve implementation of environmentally-sound ocean management regimes is exploited.
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<td>NIOMR</td>
<td>Nigerian Institute of Oceanography and Marine Research</td>
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<td>EEZ</td>
<td>Exclusive Economic Zone</td>
</tr>
<tr>
<td>FDF</td>
<td>Federal Department of Fisheries</td>
</tr>
<tr>
<td>FAO</td>
<td>The United Nations Food and Agriculture Organisation</td>
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<tr>
<td>FEPA</td>
<td>Federal Environmental Protection Agency</td>
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<tr>
<td>ICONA</td>
<td>Interdepartmental Co-ordination of North Sea Affairs</td>
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<tr>
<td>MARIS</td>
<td>Marine Information Service</td>
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<tr>
<td>mbd</td>
<td>million barrels per day</td>
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<tr>
<td>NNPC</td>
<td>Nigerian National Petroleum Co-operation</td>
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<tr>
<td>BOD</td>
<td>Biological Oxygen Demand</td>
</tr>
<tr>
<td>HORMP</td>
<td>Hawaii Ocean Resources Management Plan</td>
</tr>
<tr>
<td>PPLH</td>
<td>Ministry of Development Supervision and Living Environment.</td>
</tr>
<tr>
<td>KLH</td>
<td>Kantor Menteri Negara Kependudukan dan Lingkungan Hifup (Ministry of State for Population and Environment)</td>
</tr>
<tr>
<td>SEAPOL</td>
<td>South East Asian Programme On Ocean Law policy and Management.</td>
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<tr>
<td>REPELITA</td>
<td>Rencana Pembangunan Lima Tahun (5 - year National Development Plan)</td>
</tr>
<tr>
<td>EMDI</td>
<td>Environmental Management Development Program</td>
</tr>
<tr>
<td>BAPPENAS</td>
<td>Badan Perencanaan Pembangunan Nasional (National Development Planning Agency)</td>
</tr>
<tr>
<td>NEP</td>
<td>Nigerian Environmental Policy</td>
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<td>Non Governmental Organisations</td>
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<td>Nigerian Ocean Area Management</td>
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<td>GBR</td>
<td>Great Barrier Reef</td>
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<td>GBRMPA</td>
<td>Great Barrier Reef Management Plan Authority</td>
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<td>Acronym</td>
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<td>IUCN</td>
<td>International Union for the Conservation of Nature and Natural Resources.</td>
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<td>NSWSP</td>
<td>North Sea Water System Management Plan</td>
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<td>MICONA</td>
<td>Ministerial Committee for North Sea Affairs</td>
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<td>GESAMP</td>
<td>Group of Experts on the Scientific Aspects of Marine Pollution</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<td>SEAPOL</td>
<td>South East Asian Programme On Ocean Law, Policy and Management.</td>
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<tr>
<td>TAC</td>
<td>Total Allowable Catch</td>
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INTRODUCTION

In recent years Sustainable Development has been the object of intense discussion. The World Commission on Environment and Development defines it as development which meets the needs of the present without compromising the ability of future generations to meet their own needs. From the FAO point of view, it is the management and conservation of the natural resource base, the orientation of technological and institutional change in such a manner as to ensure the continued satisfaction of human needs for present and future generations.

Other definitions have helped to explain further by saying that it involves a pattern of social and structural economic transformations which optimize economic and other societal benefits in the future. It is a type of development that must maintain a particular level of income by conserving the sources of that income.

The main issue here is development as far as economic activities and environment are concerned, because the environment is where we must live and at the same time carry out all economic activities for growth and livelihood. In man's attempt to fend for himself both from the marine and land environment have actually brought about a lot of degradation on these two key areas of the world at large. This is because such attempts have led to depletion of what needs to be sustained; i.e. the marine resources which we get from our marine environment. The marine resources which form a major percentage of the marine environment.

Concerned about present and future environmentally destructive trends, the UN General Assembly established in 1984 an independent World Commission on Environment and Development - the Brundtland Commission from the name of its Chair, Prime Minister of Norway, Gro Harlem Brundtland - to assess the extent of the damage and propose new forms of cooperation that would break out of existing patterns and policies. The commission has pointed out the intricate linkage between
development and the environment and has called for responsible management of the Earth's resources in general and the marine resources in particular.

The solution to these problems identified can be found only by the common pursuit of Sustainable Development which requires new approaches to marine and coastal area management and development at the national, subregional, regional and global levels. To achieve this, several principles have been recommended by the World Commission on Environment and Development which would help policy makers of all nations. One such principle is to integrate environment, development and economics in decision making. It is a commitment to act to prevent worsening environmental conditions through irrational developmental decisions of policy makers.

There is great need for this integration because decision-makers are responsible for the impact of their decisions upon the environmental resource capital. Focus of decision makers must therefore be on eliminating the sources of environmental damage rather than the symptoms.

The intention here is to focus on integrated management of the marine environment at the national level.
CHAPTER ONE

1.0.0 NIGERIA: A BACKGROUND

A.) Geographical background

Nigeria covers a total geographical area of 923,768 sq. km. and is one of the largest countries in Africa. It lies within the tropics along the Gulf of Guinea, on the Western coast of Africa. It is bounded on the West by the Republic of Niger and on the East by the Republic of Cameroon. The Northern boundary is approximately at 14° North while the most southerly point near Brass in the Niger Delta Area is about 4° north of the Equator. The eastern frontier reaches nearly to the 15° east meridian south of Lake Chad in the north-eastern part, then runs in a south-westward direction to the Cross River estuary in the Gulf of Guinea while the western frontier runs nearly north and south along the 3° east meridian.

The two major rivers that run through the country are the Niger and the Benue. The Niger and the Benue run from North to South with the Niger taking its source from the Fouta Djalon Mountain of Sierra Leone while the Benue takes its source from the Cameroon, a major tributary to the Niger. The Niger and its tributaries, the Benue and others empty their water into the Atlantic Ocean through the Gulf of Guinea where it forms a Delta known as the Niger Delta.

There are many rivers and rivulets along the coast most of which serve as an outlet to the Ocean in many of the coastal regions, e.g., the Bonny River provides Port Harcourt with an outlet to the sea.
B.) Economy

Nigeria has a population of a hundred million people with over 200 ethnic groups. Until Nigeria regained independence in 1960, agriculture was the most important sector of the economy, accounting for more than one half of the GDP and 3/4 of export earning. With the rapid expansion of the petroleum industry, agriculture was neglected and Nigeria was transformed from an agriculture based economy to a major oil exporter. This generated high levels of real economic growth and by the mid 1970s Nigeria ranked as major oil exporter.

C). Climate

Nigeria lies in the tropics and hence has tropical weather. There are two major seasons in the country, the dry season runs from November to April and the rainy season, May to October. The rainy season is characterized with heavy floods from July to September with an annual temperature of 28-32°C, (Awosika 1992).

D.) Political System

The Federal Republic of Nigeria is composed of 30 states and a Federal Capital Territory of Abuja. Three tiers of government are in existence in Nigeria. These are: Federal, State and Local Governments. All three tiers of government exist under the Nigerian constitution of 1st October 1979 and amended on 6 February 1984 with a strong Federal system.

1.1.0 THE NIGERIAN OCEAN ENVIRONMENT

Nigeria is located along the Atlantic coast of West Africa, i.e., the Gulf of Guinea as noted earlier. She has a coastline of about 830 km between the Western and eastern borders of the country with the Republics of Benin in the West and Cameroon to the East respectively. It has a maritime area of 46,300km² between 0 - 200m depth with an Exclusive Economic Zone of 210,900km² which lies between 4°10′ and 6° 20′
North latitude and 2° 45′ and 8° 32′ E longitude to the Gulf of Guinea, (World resources, 1990).

Fig. 1.1 The coastal area: Coastal states

Fig. 1.2 The Coastal Land Areas

Figure 1.2 Map showing the coastal areas of Nigeria
The Nigerian coastal zone includes some of the important and extensive wetlands in West Africa. It is well connected to the inland waters by a network of river systems especially in the central eastern part. It is washed by 2 currents; the cool Guinea current and the warm equatorial current with vegetation comprised mainly of mangrove swamps. The Nigerian coastal area is characterized generally by low-lying sandy beaches throughout its entire length, indented with lagoon systems in the west as well as the delta complex which is the Niger Delta.

The continental shelf is characterized by more or less uniform gentle slopes broken at specific points by submarine canyons (avon, mahin and calabar canyons). Shelf width ranges from 15 km in the west to about 67 km in the Niger Delta and about 87 km off the Cross River estuary in the east, (Awosika 1993).

1.1.1 DEFINING THE NIGERIAN OCEAN ENVIRONMENT.

Convention for the protection of the Marine Environment of the North East Atlantic defines the Maritime area of a Nation as:

"the internal waters and the territorial seas of the contracting parties, the sea beyond and adjacent to the territorial sea under the jurisdiction of the coastal state to the extent recognized by international law, and the high seas, including the bed of all those waters and its sub-soil, situated within the following limits:"

The interpretation of the UNCLOS provides for 4 - areas for the purpose of delimitation of the EEZ. These are:

- the territorial sea
- Exclusive Economic Zone
- Continental Shelf
- International Sea-bed Area
The Nigerian territorial waters extend to 30 nautical miles of the coast of Nigeria. This supersedes the earlier claim of 12 nautical miles of the Territorial waters Act of 1967. (NEP 1991). The latter is within the purview of the International Sea-Bed Authority. Only the first 3 areas come under the jurisdiction of the coastal state. Since the continental shelf falls within the EEZ, it then means that only the territorial sea and the EEZ limits can be regarded as the marine area (environment) which is under consideration for this study. It also means that internal waters, the high seas, and the area (area beyond the limits of national jurisdiction) are not to be included.

The Nigerian Coastal area extends from the fresh water swamps to the littoral zone, (Nwilo et al 1993). Figs 1.1 and 1.2 show the map of the coastal area.

In general the marine environment embraces the wetlands of
- rivers, estuaries, marshes and coasts
- the chasms, mountains and trenches at the sea floor, among the deepest and tallest on earth
- the mid water region where most marine life exist and
- the sunlit waters where plants are able to photosynthesize, and where critical gasses pass to and from the atmosphere in a complex process that determines the climate and ultimately, the weather for the entire world.

The Nigerian marine environment, as shall be referred to in this paper covers just as much as what has been described and listed above. Physically, the Nigerian marine environment stretches over a distance of 830 km from the East to the West and outward to the sea it covers the 200 miles jurisdictional zone and beyond to the high seas. Land-ward it covers the coasts, the lagoons, estuaries, the marshes, the beaches and creeks all of which are an extension of the ocean.
The present study covers the Nigerian marine area that is strictly under its jurisdiction i.e. the EEZ and its territorial waters according to international regulations laid down by UNCLOS as follows.

The EEZ, according to UNCLOS, is an area beyond and adjacent to the territorial sea, subject to the specific legal regime established in this part, under which the rights and jurisdiction of the coastal state and rights and freedoms of other states are governed by the relevant provisions of this convention. The breadth of the EEZ as stipulated by UNCLOS

"shall not extend beyond 200 nautical miles from baselines from which the breadth of the territorial sea is measured" (UNCLOS, 1982).

Nigeria's approximately 830 km long coastline is taken as the baseline to its 30 nautical mile territorial sea and a 200 nautical mile EEZ.

In the EEZ, the coastal state has sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources whether living or non-living, of the waters super-adjacent to the sea-bed and of the sea bed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds.

To the coastal state like Nigeria therefore, falls the right and obligation to exploit, develop, manage and conserve in a sustainable manner, all of its resources such as fish, oil, gas, gravel, etc., as may be found in its territorial waters that extend 200 miles from its shore and over its continental shelf.

A coastal state must therefore have a framework put in place for management which involves multipurpose development covering all uses of ocean space and resources and with special regard to environmentally friendly technological development.
Fig 1.3(a & b) give rough picture of the Nigerian jurisdictional waters (from clifffed and depositional coast point of view) from the baseline to the open sea within the EEZ of 200 miles.

Fig 1.3 shows that the shore itself is divided into 2 zones: the foreshore, extending from the lowest low-water line to the average high-water line while the back shore stretches from the high water line to the coastline.

Recent population projections indicate that up to 30% of the estimated 100m people in Nigeria live in the coastal area of the marine environment with population densities of more than 400 persons per sq. km in urban centers like Lagos, Warri, Port Harcourt and Calabar (Nigeria in maps 1982). These urban centers are ports and industrial cities that attract job seekers, and those craving for a taste of city life, both of whom are from the rural areas.

Apart from the large urban centers, several important historical settlements like Badagry, Forcados, Brass, Abonema, Opobo and Duke Town with enduring monuments of early European contacts and trade are located on or near the coast. In these settlements populations reaches 150 persons per sq. km. (Nigeria in maps, 1982). It harbours up to 30% of Nigeria’s 100 million people.

The Nigerian ocean coast is made up of seven states out of the 30 states of the federation namely Lagos, Rivers, Cross Rivers, Akwa-Ibom, Delta, Ogun, and Ondo, states. as well as some large southern states of Edo and Imo which share boundaries with these coastal states. Table 1. 4 shows coastal states and their populations as well as land areas.
Table 1.1: Land area and population density of coastal states in Nigeria.

<table>
<thead>
<tr>
<th>STATE</th>
<th>1992 CENSUS</th>
<th>AREA (Sq.Km)</th>
<th>DENSITY (Per km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edo* and Delta</td>
<td>4,730,029</td>
<td>35,500</td>
<td>133</td>
</tr>
<tr>
<td>Cross River and</td>
<td>4,225,340</td>
<td>27,237</td>
<td>155</td>
</tr>
<tr>
<td>Akwa Ibom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lagos</td>
<td>5,685,781</td>
<td>3,345</td>
<td>1,700</td>
</tr>
<tr>
<td>Ogun</td>
<td>2,338,570</td>
<td>16,762</td>
<td>140</td>
</tr>
<tr>
<td>Ondo</td>
<td>3,884,485</td>
<td>20,959</td>
<td>185</td>
</tr>
<tr>
<td>Rivers</td>
<td>3,983,857</td>
<td>21,850</td>
<td>182</td>
</tr>
</tbody>
</table>


NOTE: States of Edo (is without a coastline) and Delta were together as one state as at 1992 when census was conducted, same goes with Cross River and Akwa Ibom (both are coastal states).

The reason for the above delimitation of the Nigerian marine environment is that it is widely believed by many environmentalists that the open ocean is still relatively clean compared to the jurisdictional zones as defined above. The open ocean is therefore not within the scope of this study.

1.1.2 THE COASTAL CHARACTERISTICS

The coastal region of the Nigerian marine environment can best be divided into 4 distinct geomorphological units (fig. 1.4) as follows:

The Barrier - lagoon system lies to the west stretching for almost 250 km from the Nigerian/Benin border to 100 km east of Lagos. The narrow barrier bar fronting the ocean is backed by the Lagos, Lekki, Yelwa lagoons and many tortuous creeks.
The Mahin transgressive mud coast. The mud beach is a stretch of coastline starting from the area of Mahin 100 km east of Lagos to the vicinity of the Benin River. It runs for almost 75 km to the north western flank of the Niger Delta. It is mainly covered with silt and clay size sediments and sand is completely absent along this beach. The muddy nature is as a result of the fact that it is a low lying area.

The Arcuate Niger Delta. The Niger, covering almost 20,000 sq. km is the second largest delta in the world. It covers the coast for about 450km. About 2,370 sq. km of the Niger Delta area is covered by rivers and creeks, while 8,600km² are stagnant swamps. The Niger Delta has the largest mangrove swamps in Africa extending over an area of 9000 km² (Allen, 1965) and they are rimmed by about 20 barrier islands.

The Strand Coast is east of the Niger Delta covering about 85km down to the Nigeria/Cameroon border. This is fronted by flat sandy beaches which change into a beach ridge plain behind with a few, small swamp systems. It has within it the Cross River estuary which is the largest estuary in Nigeria.

1.2.0 THE SIGNIFICANCE OF THE NIGERIAN OCEAN ENVIRONMENT

Historically, the early Europeans gained access to the country through the coastal region and it has ever since served as a major route to the outside world. The Nigerian Ocean environment is very actively used just like all other ocean environments of other coastal states world-wide. Anthropogenetic activities can be identified under two broad headings:

- Land based coastal and hinterland activities of coastal states and cities.
- Offshore activities - from shallow waters to the high seas within the Nations territorial jurisdiction.
Fig. 1.3(a&b) Nigerian Jurisdictional Waters (cliffed and depositional coasts)

(cliffed)

<table>
<thead>
<tr>
<th>COASTAL WATERS</th>
<th>BARRIER</th>
<th>LAGOON</th>
<th>HINTERLAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFFSHORE</td>
<td>BAR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.W.M.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L.W.M.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SHORE</th>
<th>LAGOON</th>
<th>HINTERLAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEARSHORE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOW TIDE SHORELINE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIGH TIDE SHORELINE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COASTLINE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(depositional)
The importance of the marine environment lies in the fact that the country’s economy is closely tied to it. It will be worthwhile to note that a significant portion of the nation’s resources is located there as we shall see shortly.

The ever increasing population of the coastal region around the Nigerian marine environment has led to indiscriminate exploitation of the coastal resources as manifested in such activities as sand mining, quarrying, wood cutting and fishing technology. Details on these are given in subsequent sections of this chapter.

Apart from a fledging inland ports at Onitsha, all other ports or harbours in Nigeria are located within the coastal zone of the Nigerian Marine environment. These ports which include Sapele, Bonny, Burutu, Onne and Koko, constitute the economic life line of the country by supporting important export trade. Many canals, creeks and rivers in these coastal regions particularly in the Niger Delta, provide sometimes the only communication links between individual coastal towns and settlements and between them and the hinterland.

Three out of the four functional international airports are located within the coastal region in addition to other local airports and helipads. Many roads and rail systems have their termini located in the coastal zone. The significance of the Nigerian Marine Environment is basically that of the resources it contains and the activities taking place as indicated in the next section.

1.2.1 NATURAL RESOURCES

(1). The Mangroves
The vegetation along the Niger Delta is comprised mainly of mangrove forests. The mangroves is within the brackish water ecosystem of the Niger Delta cover an area of 9000 sq.km, (Isebor, 1993, p 209) and have a width of 8 - 16 km. The swamps are
The morphology of the Nigerian coastline.

Source: After Allen (1964)
separated from the open sea by barrier-bar islands which are usually broken by tidal channels.

The mangrove ecosystem is rich in the diversity of fauna, accommodating fresh brackish and marine species each occupying its own niche during a particular season. It serves as the breeding, spawning and nursery grounds for a wide variety of fish including the finfish and shellfish resources which are the targets of the artisanal fishery.

The mangrove supports quite a diversified fauna and flora as well as other activities. It has been noted by Isebor (1993 p209) that the mangrove support about 195 species of phytoplankton as well as other forms of life such as diatoms, dinoflagellates, silicoflagellates, zooplankton and crustaceans. The distribution and abundance of these organisms depend on the salinity and season. The importance of these organisms is strictly tied to the role they play in the foodchain. For instance, fish depend on plankton production while crustaceans and mollusc are particle feeders.

Birds like the kingfisher, long tail-led cormorant, little bitten and a host of others use this zone for foraging and as breeding grounds.

In recent years the mangrove ecosystem of Nigeria has been the site of conflicting activities. Oil/gas exploration and exploitation as well as other activities that relate to the oil/gas industry, fishing and aquaculture, location of numerous manufacturing industries and various other activities such as land reclamation for settlements all take place here. Because of these intense activities, the area has been labelled the most endangered delta in the world (Dappa-Biriye, 1992).

The flora consists of other vegetation made of thick tropical forests dominated by
climbers. Giant trees like the iroko, palm trees, mahogany and obeche trees are of high economic value.

In general, the Niger Delta and the Nigerian coastal wetlands have been described as one of the most fragile ecosystem in the world and (which include rainforest and mangrove habitats), (shell, 1993).

(2). **Fisheries resources**

The Nigeria ocean area is blessed with lagoons, creeks and estuaries along its coast and a shallow inshore region. These together with the rich mangroves provide a large source of fish and fisheries products mostly through artisanal fishermen and at subsistence level. The artisanal fishermen and women who harvest fish, shrimps and molluscs in the fresh, brackish and immediate marine waters with set nets, traps and other passive gear use crafts ranging from paddled dugouts to motorised large canoes.

**Structure and feature of Nigerian Fishery**

Nigeria's fishing industry contributes a relatively small portion to the country's Gross Domestic Product (1.7%) (Holman 1991), but plays an important role in the local diet as an inexpensive source of protein. There are three sectors in the Nigerian fishery; artisanal, industrial and aquaculture. The industrial fishery account for about 90% of the total domestic fish production and the artisanal contributes less than 10% to the domestic production (FDF 1990).

The artisanal sector concentrates on local markets while the industrial fishery sector is both local and for export especially in the area of shrimping operations which in 1989 amounted to 97% of the total fishery export earnings. Tobor (1984) has stated that the shrimping sector is capable of generating hard currency for the Nation's total fish production of 6.5% between 1980 and 1989. Aquaculture contributes very little to both domestic productions and nothing at all to commercial fishery.
There are four basic categories of fishery in Nigeria. These are the inshore pelagic fishery which include the bonga, herring, sardines and the West African shad. The yield of this from both coastal and brackish waters have been put to be 70,000 - 90,000 tonnes by Ajayi and Talabi (1984). The local Fish Production (in tonnes) from all sources in Nigeria (1980 - 1989) is as follows:

Table 1.2: LOCAL FISH PRODUCTION IN TONS

<table>
<thead>
<tr>
<th></th>
<th>Small scale</th>
<th>Trawl</th>
<th>Aquaculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>462,567</td>
<td>13,651</td>
<td>-</td>
</tr>
<tr>
<td>1981</td>
<td>481,783</td>
<td>9,611</td>
<td>-</td>
</tr>
<tr>
<td>1982</td>
<td>497,210</td>
<td>18861</td>
<td>-</td>
</tr>
<tr>
<td>1983</td>
<td>523,251</td>
<td>19,245</td>
<td>20,476</td>
</tr>
<tr>
<td>1984</td>
<td>359,003</td>
<td>25,650</td>
<td>22,012</td>
</tr>
<tr>
<td>1985</td>
<td>201,383</td>
<td>26,142</td>
<td>15,000</td>
</tr>
<tr>
<td>1986</td>
<td>267,136</td>
<td>25,042</td>
<td>14,881</td>
</tr>
<tr>
<td>1987</td>
<td>248,987</td>
<td>24,900</td>
<td>15,227</td>
</tr>
<tr>
<td>1988</td>
<td>297,624</td>
<td>35,608</td>
<td>15,764</td>
</tr>
<tr>
<td>1989</td>
<td>303,454</td>
<td>33,645</td>
<td>25,607</td>
</tr>
</tbody>
</table>

Source: Federal Department of Fisheries, 1990.

The inshore demersal fishery are the bottom fish species such as croakers, sole, catfish, threadfin and shinynose, grunters, sharks and rays as well as shrimp. These represent a major supply for the fresh fish market. Tobor (1990) reported an average estimate figure of 6,370 tonnes as the potential yield of offshore demersal resources according to Gulland (1971,1983).
The yield of the coastal and brackish water artisanal fisheries is estimated to be between 128,000 - 170,000 million tonnes/year (Ajayi and Talabi 1984). Fish is an important component of the diet of Nigerians but presently much of this is being exploited by foreign vessels. Thus in addition, to the Nigerian Industry Fishing, considerable quantities of fish are landed by distant water vessels on charter to Nigerian fishing companies which bring fish from other areas of the West African coast. The reason for this is that the Eastern Central Atlantic is more productive than the Nigerian waters, (FAO 1991).

It has been stated by Tobor (1991) that the total fish production in Nigeria in 1983 was 777,204 m tonnes with 501,927 tonnes coming from artisanal fishing and 15,947 tonnes from industrial marine fishing. In 1984 total production was 511,472 metric tons, of which 137,717 tons (imports), 327,211 tons (artisanal) and 24,532 tons industrial, (FDF 1990). Available data has indicated a decline in domestic fish production in the early 1980s. In recent years total production appears to have been relatively stable at around 260,000 tons per annum and a significant increase of 13 % in 1990, (FAO 1991). The increase has been attributed to the recent efforts by both the Federal and State Governments to increase the supplies of fishing inputs. More could be achieved if good fisheries management and policy is put in place.
<table>
<thead>
<tr>
<th>Year</th>
<th>Population (millions)</th>
<th>Fish consumption per capita (kg)</th>
<th>Fish Demand (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>96.126</td>
<td>10.59</td>
<td>1,010,000</td>
</tr>
<tr>
<td>1986</td>
<td>98.586</td>
<td>10.35</td>
<td>1,070,000</td>
</tr>
<tr>
<td>1987</td>
<td>101.207</td>
<td>11.11</td>
<td>1,123,000</td>
</tr>
<tr>
<td>1988</td>
<td>103.693</td>
<td>11.37</td>
<td>1,179,000</td>
</tr>
<tr>
<td>1989</td>
<td>106.345</td>
<td>11.63</td>
<td>1,237,000</td>
</tr>
<tr>
<td>1990</td>
<td>109.067</td>
<td>11.89</td>
<td>1,297,000</td>
</tr>
<tr>
<td>1991</td>
<td>111.858</td>
<td>12.15</td>
<td>1,359,000</td>
</tr>
<tr>
<td>1992</td>
<td>114.720</td>
<td>12.41</td>
<td>1,424,000</td>
</tr>
<tr>
<td>1993</td>
<td>117.657</td>
<td>12.67</td>
<td>1,491,000</td>
</tr>
<tr>
<td>1994</td>
<td>120.669</td>
<td>12.93</td>
<td>1,560,000</td>
</tr>
<tr>
<td>1995</td>
<td>123.759</td>
<td>13.19</td>
<td>1,632,000</td>
</tr>
<tr>
<td>1996</td>
<td>126.929</td>
<td>13.45</td>
<td>1,707,000</td>
</tr>
<tr>
<td>1997</td>
<td>130.180</td>
<td>13.71</td>
<td>1,785,000</td>
</tr>
<tr>
<td>1998</td>
<td>133.516</td>
<td>13.97</td>
<td>1,865,000</td>
</tr>
<tr>
<td>1999</td>
<td>136.933</td>
<td>14.23</td>
<td>1,949,000</td>
</tr>
<tr>
<td>2000</td>
<td>140.446</td>
<td>14.49</td>
<td>2,035,000</td>
</tr>
</tbody>
</table>

Source: J. G. Tobor 1984

Conservative estimates put Nigeria's population at over 100 millions and the corresponding annual demand for fishery products at 1.5 million tonnes as shown on table 1.3 above.

Transactions in the fishery business involve several groups such as fishermen, vessel owners, gear owners and traders. The new convention of the Law of the Sea signed in December 1982 gives maritime states like Nigeria control over the resources of their
coasts up to 200 miles offshore. This means that with termination of foreign fishing vessels activity, it can be hoped that stock and catch will increase.

To produce more fish from the sea without depleting the fishery resources through overfishing has been a basis of research by Nigerian Institute of Oceanography and Marine Research (NIOMR). This depends very much on careful planning and integrated management of the Nigerian Marine environment in order to achieve sustainable development.

**Shrimping Industries**

Shell fishes within the coastal zone of Nigeria are penaeid shrimps, white shrimps, brackish prawn, river prawn and juvenile pink shrimps. A survey on shrimps resources by the Federal Department of Fisheries has revealed the profitability of shrimping further confirming Tobor’s statement in 1984. This is because the penaeid shrimp resources are abundant in the Niger Delta due to the delta’s broad continental shelf and numerous outlets to the sea that allow movement of juvenile shrimp between the ocean and brackish waters (Abohwere, 1993 pp 1-3).

Other reasons are: (1) the morphology of the Nigerian coastal waters providing an environment that is very conducive to shrimps. 
(2) The abundance of mangrove swamps even though the lifespan of the mangrove is being threatened by other activities such as oil/gas production and transportation. 
(3) the existence of estuaries, lagoons and delta area which are rich in sediments of muds and high organic matter.

The Nigerian penaeid shrimp stock are concentrated off Lagos from River Benin to Pennington and from River Bonny to the Cross River Estuary in an area totalling over 4,000sq.mile (Amadi, 1991). These areas which provide a favourable condition for their existence records the highest catch in shallow waters of 20-25m. The penaeid
species of most economical value found in Nigerian waters are *Penaeus notialis* though many other species are found.

Comparison of estuarine and inshore shrimping by Abohweyere (1993) has revealed that more catches are made in the inshore waters but the migratory habits of the shrimps makes the sea much more essential to them. The Nigerian shrimp exhibits peculiar migratory habits, adults spawning in the ocean with the growing larvae moving into estuarine, creeks and lagoons to grow to juvenile in 6-8 months. These then leave estuarine water and migrate to sea to spawn and die.

The shrimp resources in the sea are exploited by the industrial fishery which is capital intensive and involve some technical expertise. In the Escravos estuary, a catch rate of 6.67 kg/hr was made by small scale fishermen while the commercial trawlers' catch rate off the Escravos River at sea is 174.7 kg/hr. The artisanal fishermen catch juvenile pink shrimps with set nets in the Lagoons while the commercial fleets trawl for the adults in the deeper oceanic waters. Between 1981 and 1984 the total commercial shrimp catch per year ranged from 2,003 to 2,525 tons, (FDF, 1990. Fish Stat. of Nigeria).

The number of shrimpers in Nigeria between 1969 - 1978 increased tremendously from 8 in 1969 to 27 in 1978 which is an increase of 33% (FDF, 1990). Between 1979 and 1988 the number rose to 162 and almost doubled in 1989 to 282. There was a general increase in landings from 585 tonnes in 1969 to 5294 tonnes in 1983, (FDF, 1990).

The presence and abundance of the skipjack tuna stock have just been discovered by NIOMR. This is highly marketable as it can be exported to earn the country foreign exchange, Tobor (1985).
The world demand for tuna has always been on the increase over the years and reports from the international tuna commission have indicated that except for skipjack, other tunas are presently over fished and facing other disasters as well. It goes to show that only the skipjack which abounds in Nigerian waters can meet the global demand for tuna. This depends very much on good management.

Nigerians are currently being trained in tuna fishing methods which would surely call for adequate planning and management of this important resource for a sustainable yield. Other types of fish species include the mangrove oyster and molluscs.

These contribute to the nation’s march towards self sufficiency in its protein needs and also provide exportable resources with high foreign exchange earning potential. It has been estimated by Talabi and Ajayi (1981) that a metric ton of prawns fetches 12,000 USD and the author believes that it could be higher than this presently. They have also estimated the annual production of shrimps and oysters to be approximately 48,000 tonnes.

3. Oil and Gas

Nigeria is the 6th largest producer of crude petroleum oil in the world, the second in Africa and a strong member of OPEC. Nigeria’s production capacity reached 2.3million barrels per day (mbd) in the late seventies but declined to 1.3mbd, due to OPEC restrictions. Despite this, petroleum still accounts for more than 90% of the country’s exports and foreign exchange earnings, (NNPC, 1990).

The extraction of crude oil, and gas from the coastal areas particularly in the Niger Delta has been going on since the early 1960s. Most gas produced is flared, while a little is re-injected into the ground, however, there is a planned liquefied natural gas
project which will further increase the importance of the exploitation of petroleum to the National economy.

According to World Resources, 1988, Nigeria has the capacity to produce 900 million barrels per annum. A recent information in the West African Magazine, (1994 p 834) stated that Nigeria has the capacity to produce 2 million barrels per day and OPEC quota of 1.8 mbd. It then means that Nigeria still maintains the production capacity of 700 - 900 mb per annum. It should be noted however, that both figures are based on both offshore and onshore wells with quite substantial quantity of the production coming from offshore.

Nigeria has four major oil refineries with production capacity of 450,000 barrels per day (bpd), (West Africa, May 1994 p 834). Since its discovery, the Nigerian oil from both offshore and ashore have played a major role in its economic development and both have had serious negative impacts on the marine environment.

**Nigerian Offshore Oil/Gas Production.**

The table on appendix 1, gives the names of offshore fields within the Nigerian Territorial Waters as well as production in barrels per day according to MARIS 1995. As further indicated by MARIS, Nigeria has up to 58 offshore oil fields within its ocean jurisdiction. Oil production is carried out within shallow waters at an average depth of 5m to 80m. The map on fig. 1.5 also shows the location of some of these offshore oil wells.

4. **Sand /Gravel Extraction.**

This is done for beach replenishment and for building activities. Extraction is carried out in all the coastal states of Lagos, Bonny, Port Harcourt, Forcados and Escravos. Sand is extracted from nearshore for reclamation of beaches like the Lekki, Victoria
Island and parts of Ikoyi. The impact of this is erosion near points of extraction as there is a reduction in the amount of sand available for the natural beach nourishment.

1.2.2 OTHER ACTIVITIES

1. Industries

Of the 2000 industries established in Nigeria about 85% of them are concentrated within the coastal zone of the Nigerian Marine Environment (Ibe, Awosika and Udo-Akam, unpublished). Lagos, Warri, and Port Harcourt are all coastal cities with heavy industrialisation. Lagos area alone accommodates about 75% of the industries. Industrial activities include iron and steel production in Warri, and a range of others such as automobile assembly, textile, pharmaceuticals, cement, soap and detergent, paints, refined petroleum products, electronics, tyre, plastics, brewing beverages, tobacco, wool and wood products all of which are located in the different industrial coastal cities.

Two of the three petrochemical as well as two of the three petroleum refineries are located in Warri and Port Harcourt. Elsewhere along the coast, local small industries like woodworks, ceramics, weaving and boat building flourish around the coastal settlements of the Nigerian marine environment.

Oil exploitation and production in the coastal areas has led to the establishment of refineries or petrochemical plants. The consequences of these is the development of satellite settlements around coastal cities like Lagos, Warri, Port-Harcourt and Calabar. This has brought about also the development of other human activities like sand and mineral mining, sand filling (land reclamation) lumbering/logging, construction of estates and fish ponds as well as the establishment of a variety of large or small-scale industries.
2. Shipping In Nigeria

Expansion of trade has brought about rapid change in the structure of the economy and a rapid development of sea ports in Nigeria. The oil boom of the 1970s accompanied with a period of high importation of manufacturing goods with its consequential port congestion, required port expansion projects to adequately handle the increased trade.

These projects actually led to an improved economic situation. The nation’s capacity to import increased phenomenally. By 1975/76 a total of 9.3 million tonnes of cargo passed through Nigeria’s ports. Table 1.4 shows the volume of traffic handled by the 4 major port complexes of Nigeria over time. Overall, the Lagos complex was responsible for 68% for the traffic during the period 1956 - 1980 followed by Port-Harcourt, (Ogunsanya, 1986). During this period the cargo throughput of Nigerian port complexes in both tonnage and percentage were as shown below. Even though, there is no recent statistics to show the present trend, it is unlikely to have changed from what we have in the table below and Lagos still remains the busiest of all the ports in Nigeria.

Studies have shown that much of the traffic handled in Nigerian Ports are imports which supersede exports. This could be as a result of the import oriented nature of the economy. The drive for imports must have come down as against export due to the fact that much effort is being put by recent governments into making sure that Nigerians do not depend too much on imports.

This is not to say that imports exceeds exports rather the reverse is still the but there is less emphasis on imports recently. Lagos is the major port for general cargo, machinery, and industrial equipment, while Warri handles oil and fish products. Port-Harcourt and Calabar handle general as well as intermediate goods such as raw materials and fertiliser.
Table 1.4: Volume of Traffic handled by Nigerian major Ports.

<table>
<thead>
<tr>
<th>PORTS</th>
<th>CARGO VOLUME (total)</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAGOS</td>
<td>121,807.9</td>
<td>68</td>
</tr>
<tr>
<td>PORTHARCOURT</td>
<td>44,595.1</td>
<td>24.9</td>
</tr>
<tr>
<td>WARRI</td>
<td>10692.2</td>
<td>5.9</td>
</tr>
<tr>
<td>CALABAR</td>
<td>2,147.7</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Source: Nigerian Port Authority Records.

Table 1.5: Crude Oil shipped at Nigeria’s Port Terminals, (1970/71 to 1979/80):

<table>
<thead>
<tr>
<th>YEAR</th>
<th>AMOUNT SHIPPED (TONS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970/71</td>
<td>50,169,763</td>
</tr>
<tr>
<td>1971/72</td>
<td>77,946,573</td>
</tr>
<tr>
<td>1972/73</td>
<td>92,430,684</td>
</tr>
<tr>
<td>1973/74</td>
<td>94,717,879</td>
</tr>
<tr>
<td>1974/75</td>
<td>102,375,308</td>
</tr>
<tr>
<td>1975/76</td>
<td>97,097,938</td>
</tr>
<tr>
<td>1976/77</td>
<td>100,313,452</td>
</tr>
<tr>
<td>1977/78</td>
<td>93,648,251</td>
</tr>
<tr>
<td>1978/79</td>
<td>102,371,874</td>
</tr>
<tr>
<td>1979/80</td>
<td>105,262,756</td>
</tr>
</tbody>
</table>

Source: Bilingual (1981).

The trend in Nigeria Port traffic is still on the increase though with some fluctuations. Table 1.5 shows the volume of crude oil shipped at all Nigerian port terminals showing an increase over a 10 year period from 1970/71 to 1979/80.
There has thus been regular shipping through and to the Nigerian Ports within the coastal region of the marine environment as shown on appendix 2.

1.3.0 PROBLEMS FACING THE NIGERIAN OCEAN ENVIRONMENT

In view of the fact that the coastal and ocean environment of Nigeria support a myriad of activities, as well as a large population, the Nigerian coastal and marine environment is under serious pressures. Such pressures are mainly a result of:

- burning of natural gas
- oil spillages
- waste dumping
- fishing aquaculture
- ship generated pollution

A. Oil Spills
The Nigerian marine environment experiences a lot of spillages from oil/gas production activities and transportation. In terms of transportation, Nigeria serves as a transit zone for oil shipments to other West African Countries. This results in additional environmental stresses to those arising from production activities. During production, oil and gas which come out mixed, are separated. The crude oil is separated from natural gas and while the crude oil is either sent for export or refined locally, the gas is flared causing more hazard to the environment.

Oil production generally affects the fishing activities of the people both in the coastal villages and commercial fisheries. This is because oil production has brought with it, erection of offshore structures which obstruct fishing activities and even cause damage to fishing gears. Apart from this, reduced catches have often been reported after an oil spill from production activities. Oil spills have also been known to
cause damage to fishing gears and boats with the consequent reduction in fishing effort by fishermen.

Even though oil contributes up to 90-95% of the country’s gross national product (GNP), its exploration, exploitation and transportation affect the environment very significantly. Oil spillages have been a common occurrence in Nigerian waters and in fact Nigerian waters face risk of oil pollution from:

- shipping and all shipping related activities such as (i) port approach in major tanker ports and (ii) ballast and tank washing in all ports including oil terminals. There is continuous movement of ships through and to the Nigerian ports within the coastal region of the marine environment as shown in appendix 2. This brings along with it all ship generated wastes in both solid and liquid. The issue of ship generated pollutants is a chronic one due to the fact that none of the Nigerian ports are provided with reception facilities.
- offshore production activities such as installation and removal of offshore structures as well as transportation of produced oil from the rig to the refinery.

Fig 1.6 shows the high risk zones from these different activities most especially from shipping and production activities. Generally, oil spillage could be due to leakages from the oil pipelines or from the tankers that carry the crude oil. This has caused serious pollution of the environment, leading to the destruction of the flora and fauna, fisheries and mangroves; beach lovers have for many years faced the problem of tar balls floating all along the coast of Nigeria.

Several oil spills have taken place within the Nigerian marine environment. Documented cases of oil spills show that between 1976 - 1980 a total of 784 cases were reported. These oil spill incidents lost 1,337,000 barrels to the environment (Odeyemi and Ogunseitan,1985, Alba International, 1983). Environmental
distribution of reported oil spills between 1976 - 1980 has shown that the swamp zone records the highest number of oil spills in total as indicated in table 1.6 and fig 1.7.

Table 1.6: Environmental Distribution of Reported Oil Spills 1976 - 1980.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NS</td>
<td>NET VOL</td>
<td>NS</td>
<td>NET VOL</td>
<td>NS</td>
</tr>
<tr>
<td>Inland waters</td>
<td>11</td>
<td>643</td>
<td>13</td>
<td>367</td>
<td>9</td>
</tr>
<tr>
<td>Swamp</td>
<td>35</td>
<td>2,068</td>
<td>41</td>
<td>25,303</td>
<td>76</td>
</tr>
<tr>
<td>Offshore</td>
<td>27</td>
<td>16,572</td>
<td>19</td>
<td>3,2091</td>
<td>21</td>
</tr>
<tr>
<td>Dry Land</td>
<td>27</td>
<td>497</td>
<td>23</td>
<td>1,632</td>
<td>31</td>
</tr>
<tr>
<td>Dry Land with abundant swamp zones</td>
<td>8</td>
<td>243</td>
<td>8</td>
<td>632</td>
<td>16</td>
</tr>
<tr>
<td>TOTAL</td>
<td>128</td>
<td>20,023</td>
<td>104</td>
<td>31,144</td>
<td>154</td>
</tr>
</tbody>
</table>


(NS is number of oil wells)

Appendix 3 further gives details of oil spills from the different offshore oil fields over the years.

Recent data on oil spills could not be found as at the time of writing. Getting data on this is very difficult due to the fact that cases of oil spills are either not well or never documented. Critics of oil operations in Nigeria have faced all sorts of harassment from the government. This is why most oil spills are not reported by most of the oil companies and these include those spills that have had devastating impacts on the environment.

However, available haphazard reports by Alba International (1983) showed that cases of oil spills rose from one/year in 1970 to 241/year in 1980 and from 150 barrels in 1970 to 630,000 barrels in 1979. The most serious of all these is the Funiwa - 5 offshore station which blew up at about 1.00 pm January 1, 1980 and released an
estimated 146,000 barrels to the ocean, which eventually reached the adjacent land areas. All nearby fishing villages of Fishtown, Sangana, Kulama 1 and Kulama 11 were badly hit by the incident. Beaches were oiled and even though the oiled beaches were washed back to sea by subsequent tides and occasional storms, tar balls were found on the beaches long afterwards, Marquis (1983). Other spills as recorded by an independent report shows that Shell’s spills from 1982 to 1992 were 1,626,000 gallons in 27 separate incidents. Of the total number of spills recorded from Shell - a company which operates in more than 100 countries - 40% were in Nigeria alone (Intelligence Report, 1992).

These spills that occurred in the swamp zones of the coastal environment as well as offshore have subjected the creek and estuary waters to a large influx of oil slicks during this period.

Some aquatic organisms within affected waters usually respond immediately to changes in the aquatic environment by moving away from polluted areas. This is common with fast swimming marine mammals such as squids, some fishes and turtles but adult fish living in nearshore waters and juveniles in shallow water nursery grounds are highly at risk from exposure to dispersed or dissolved oil. Birds, crustaceans and other reptiles e.g crocodiles may also be vulnerable to adverse effects from oil contamination because of their need to surface to breathe and to leave the water to breed. Birds have been known to suffer greatly from the effect of oil spills as they can easily get soaked with oil when they get in contact with oil-covered water surface.

Mangroves and other types of vegetation have been lost. This is due to the fact that the oil blocks the air breathing roots and also interferes with their salt balance causing
Fig. 1.6  High Risk Zones of Nigerian Waters

Offshore production
Likely points of impact

Through-shipping
Likely points of impact

Port approach
major tanker ports

Ballast and Tank washing
Likely points of impact
their leaves to drop and the trees to die. Oil also damages the root systems which serve as a breeding ground for fishes hence affecting fisheries adversely.

Recreation has also been affected in a serious way as coastal amenities get contaminated disrupting the tourism industries. This can be restored if proper clean up is done; however clean up is so costly that sometimes it is never well carried out as funds are limited and proper equipment is lacking. There is also no proper legislation in place to enforce thorough clean up. Other coastal facilities in the ports, shipyards, coastal industries as well as shorelines and wetlands are badly affected and commercial activities have been held up during spillages.

B. Waste Dumping

The presence of high populations and industries such as Lagos which is the most industrialised town in Nigeria, together with a number of other industrial towns like Port Harcourt, Bonny, Forcados, Escravos, Brass and Calabar all of which are within the coastal areas of Nigeria, have great negative impact on the marine environment. Industries such as fertilizer plants and petroleum refineries depend on the ocean water for their operations and for waste disposal. These industries extract water from the rivers and ocean for use in their processes and dump their untreated effluents back into them both directly and indirectly.

A typical example is the Lagos lagoon which is like a “septic tank” as local industries have directly discharged sewage into the lagoon continuously over a long period of time.

Villages along the coastal areas of Nigeria have no sanitation systems hence domestic sewage ends up in the rivers, lagoons and the oceans. Another source of waste in the ocean is through inland rivers which empty into the sea. These rivers serve as
Fig. 1.7  Environmental distribution of reported oil spills
dumping ground for wastes from homes and industries and eventually deliver their effluent to the ocean.

Direct disposal of sewage leads to increased BOD i.e. reducing the amount of dissolved oxygen that is available for aquatic life. The result of this is elimination of aquatic life on which man depends.

C. Fishing and Aquaculture

The rural coastal dwellers all engage themselves in subsistence fishing as a full time occupation. There are no controls on the amount of fish taken or the methods used. Commercial fishing is so unregulated that it has brought about overfishing. The situation is further worsened by the indiscriminate use of pesticides such as gammalin 20. This result in massive death of fish and other forms of aquatic life as well as disrupting the food chain.

The Nigerian marine environment thus supports quite a lot of activities both at low level in a subsistence manner and at high level for commercial purposes as seen in the living resources, non-living resources and all other activities taking place within the coastal region and offshore of the Nigerian marine area. Exploiting these resources has brought about various problems which, in most cases, result in conflicts of use. The effect of one use on another use or uses is always there.

1.5.0 EFFECTS OF THESE ACTIVITIES

Apart from the above mentioned operational hazards, there are other effects resulting from the activities associated with exploiting these resources.
1. Exploitation of Non-living Resources.

Most offshore oil wells were located in shallow water near the coast in the past but in more recent years oil and gas have been found in deeper waters further offshore. Environmental impacts are possible at all stages of oil exploitation right from the initial surveys to locate reserves up to the production stage.

In the initial surveys to locate reserves, the explosives used are dangerous to fish. Other activities such as seismic surveys for assessing oil potential of a field, exploratory drilling from ships or temporary platforms cause disturbance to the ocean bottom and the other marine communities of the living resources. Production facilities that are set up for oil production also have adverse effects on the environment. During production, oil spills could occur as a result of operational releases and/or from accidents.

Both exploratory and production installations use drilling muds, and produce large quantities of cuttings or rock fragments derived from the drilling. The cuttings are disposed of over the side of the platform. These accumulate on the bottom and may affect an area of up to 3 km radius around the platform which of course causes obvious changes in the benthic communities. The presence of rigs and pipelines creates exclusion zones for fishing vessels and shipping in general. The debris associated with offshore oil operations can damage fishing gear or entangle ship’s propellers.

There is also the problem of disposing of installations. The cost of total removal of all existing platforms was estimated by the International Exploration and Production at 10 million dollars in 1983 (Gesamp, 1990 p326). The table 1.7 below, gives cost as distributed among various countries. In West Africa the major and almost only oil producer is Nigeria.
The oil industry has undoubtedly brought economic benefits to the nation but it has left in its trail a complex mix of environmental, political and socio-economic problems. This is as a result of management strategies that do not take into consideration the needs of our future generations.

Table 1.7: cost of removing existing oil platforms

<table>
<thead>
<tr>
<th></th>
<th>Number of platforms</th>
<th>Cost of total removal ($ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Sea</td>
<td>83</td>
<td>7393</td>
</tr>
<tr>
<td>Gulf of Mexico</td>
<td>890</td>
<td>2037</td>
</tr>
<tr>
<td>Middle East /Gulf</td>
<td>445</td>
<td>382</td>
</tr>
<tr>
<td>West Africa</td>
<td>49</td>
<td>155</td>
</tr>
</tbody>
</table>


Other minerals such as heavy metal placers, metalliferous, oozes, nodules, sand and gravel shells occur within the continental shelves at depths less than 200 meters with only a few in deeper waters. Mining of these cause disturbances of the water column and on the sea bed. The main disturbances to the environment are from the noise generated and its obscuring light at the sea bottom. The local impact on the bottom is such that immobile and slow - moving benthic species are damaged by the mining’s machinery. While the far field effects are on the sea bed, surface and midwater effects are minimal.

2. Exploitation of living resources

The fishing industry in Nigeria has been described in Section 1.2.1. There are certain highlighted factors associated with this industry known to influence the distribution, abundance and capacity for sustained exploitation of fish resources:
- Natural factors such as narrow continental shelves limits the number of fishes available while wind induced seasonal upwelling in the western sector of the Gulf enrich the fisheries.
- Man-made factors such as pollution of coastal waters from industrial wastes, raw sewage pesticides, sand mining, gas flaring, petroleum oil exploration and exploitation all cause depletion of the living resources. This is the major why the Nigerian waters are not as productive as the Eastern Central Atlantic, (see section 1.2.1 fishery resources).
- Obnoxious methods of fishing employed by the artisanal fishermen such as the use of explosives, Gamalin 20, Adrex 40, Didimac 25 and the use of leaves of ichthyotoxic plants e.g. Accacia pennata (Tobor1992) kill fishes indiscriminately without regard to maturity or harvestable size. This is done by the fishermen because they have a low perception of the consequences of their actions on the capacity of the resources for sustainable exploitation.
- Erosion has been cutting deep into Nigerian Coasts and is destroying nursery grounds for a large number of fish and shell fish species.
- Overfishing and lack of effective management of fish resources allows fishing to be done close to maximum sustainable yield. There is no adequate regulation on the limit of fishing effort applicable to the artisanal and industrial fisheries. There is also no regulation on the minimum size of each commercially important species that can be landed by fishermen.
- Lack of adequate technology to harvest deep sea fish resources causes an increase on the concentration of fishing effort on the limited supply of croaker which is the mainstay of the industrial trawl fishing. This threatens the capacity of the resources for sustained exploitation.
- Poaching renders management and conservation efforts ineffective. The fish catch of poachers while significant can not be quantified and hence limits the ability to manage fishery resources.
• Reliance on foreign vessels and fishing from other West African waters, as discussed earlier, makes the Nigerian fishery operations vulnerable to changes of policy by countries from whose EEZ the supplies are taken.

• As noted earlier, the Nigerian fisheries is exploited by small, widely dispersed units and this makes accurate statistical coverage and reasonable assessment of production particularly difficult.

Fisheries exploitation has significant physical effects on the sea bed as fishing operations can cause physical damage to attached benthic plants and animals. Removal of large numbers of organisms alters population age structures and the composition and structure of food webs. Large modern demersal fishing use extremely heavy gear with as many as 15 ticker chains weighing up to 12 tonnes in front of the trawl to stir up fish. Effects on the bottom include radical changes in the distribution of sediments and rocks, which result in a general unevenness of the bottom to the extent that the operations of fishermen using light gear in the same area are adversely affected.

3. Other Activities

A. Accidents

The accidents of greatest marine significance are more likely to be those which occur at installations directly on the coast, or on ships or rigs at sea. Some of these may involve chemicals but most are associated with oil.

The loading and unloading of cargoes and fuel tanks result in frequent, but usually small, spills at port, terminals and storage facilities. The major unplanned inputs of oil are from shipwrecks, blowouts or other incidents at offshore platforms, or from undersea pipeline rupture. Tanker accidents are the most frequent problem.
Long term effects occur when oil is carried onto beaches, particularly in sheltered areas and becomes buried in sediments, from which it may leach out and cause contamination for a decade or more.

The economic and social costs of spills can be very large and include loss of living resources of commercial value, loss of tourism income, damage to ecosystems, reduced amenity value and high clean up costs.

Still, some accidents are due to natural events such as storms, or failure of equipment. However, most arise from human error. Their risk may be reduced by constant attention, adequate technology and good working practice.

B. Transportation

Statistics showing how much Nigerian Ports are used include the following:

- shipping - judging by how many ships call there,
- also as point of transhipment from many of its ports
- transit zone for many other ships passing through from other nations e.g. the West African countries and foreign ships as indicated in figure 1.6.

Accidental spills from ships, account for a substantial input of oil and other pollutants to the sea as both crude and finished products. In general, accidents resulting from marine transport activities have been reduced as a result of the provisions of MARPOL 73/78 which requires tankers to be fitted with segregated ballast tanks and crude oil washing systems. It also requires ships to have effective oil/water interface detectors and overboard discharge monitors. This has reduced operational pollution from tankers and other vessels.

The Nigerian case however has not received the same benefit since Nigeria has not ratified MARPOL and most ships calling at the port do not feel that they need to
comply with any international rules. Fig 1.7 indicates those areas along the Nigerian Coast that are subject to pollution from maritime transport activities.

C. Waste dumping

Waste dumping already discussed in section 1.3.0, as a problem has serious negative impact upon the marine environment. Some these have been that of eutrophication which lead to anoxic conditions of the environment for the living organisms and consequently massive death of living organisms and a complete disruption of the marine food chain. Another problem that can emanate from this is that of sudden influx of water hyacinth (water weed) and its presence in the Nigerian marine environment has been attributed to discharge of effluents from homes and industries into the marine area amidst other causes.

So far, the various problems facing the Nigerian Marine Environment have been that of industrial pollution resulting from oil production and transportation as well as introduction of wastes that come from industries as well as domestic wastes from homes.

On a global scale GESAMP has identified the different sources of pollution to the marine environment as run-off and land based, offshore production, maritime transportation, dumping, atmosphere and from vessels (transportation). Percentages as given are shown below:
Table 1.8: Sources of pollution to the Marine Environment.

<table>
<thead>
<tr>
<th>SOURCES</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offshore production</td>
<td>1%</td>
</tr>
<tr>
<td>Maritime Transportation</td>
<td>12%</td>
</tr>
<tr>
<td>Dumping</td>
<td>10%</td>
</tr>
<tr>
<td>Run-off and land-based discharges</td>
<td>44%</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>33%</td>
</tr>
</tbody>
</table>

Source: Lee Kimball Colombo 92 conference.

In a country like Nigeria with a massive network of rivers (fig 1.8) and various economic inland activities, one cannot dispute the fact that these different sources and amount of pollutants to its marine environment would follow a similar pattern. The term land-based according to the working group of the Third meeting of UNEP in Montreal 1985 is,

“Municipal, industrial or agricultural sources, both stationary and mobile, on land, within the limit of national jurisdiction, polluting discharges from which reach the marine environment, in particular, from outfalls discharging directly into the marine environment, through coastal disposal, through rivers, canals or other water courses, including underground water-courses, through run-off, via the atmosphere.”

Land based sources of pollution have been designated by the UNEP Governing Council as a “major subject area” for top priority attention. Recognised land based sources in the world and in Nigeria particularly include urban sources from human settlements (domestic wastes, industrial effluents and agricultural activities). These either get to the sea directly where such activity is adjacent to the ocean, and where it is further inland they find their way to the sea through these network of rivers.
Fig. 1.8 The spread and coverage of rivers and distributaries in Nigeria
The dominant runoff pollution concerns are the dangerous pesticides, insecticides, fungicides and herbicides used in agricultural operations. There is also the sedimentation problem caused by deforestation. The real problem of marine pollution in Nigeria is to contain the pollution from the land, because it is the land that contributes more pollution to the seas than ocean generated pollution.

Land-based pollutants should not be neglected in the planning, management, policy and decision making.

The Nigerian marine environment no doubt plays a major role in the economic development of the country. Apart from being a major contributor to its domestic fish supply it contributes up to 50 % of its total oil production annually. From numerous uses of the coastal zone that have been addressed there can be no doubt that the Nigerian marine environment is faced with serious environmental challenges due to pollution from industrial wastes, domestic wastes, oil spills, pesticides, water hyacinth and conflicting uses in almost all marine resource sectors. This calls for stringent measures to arrest further deterioration of the marine environment which hitherto has provided great potential for the country. The success of sustainability depends very much on the management strategies put in place to enhance their full utilisation.

The present state of the Nigerian marine environment indicates the need for a positive role to be played by the government and all groups concerned with the marine environment. Thus, there is a need to have a clear picture on the government’s plans and policies for the environment in general and for the marine environment in particular.
CHAPTER 2

2.0.0 THE NIGERIAN ENVIRONMENTAL POLICIES

2.1.0 ROLE OF MARINE RESOURCES IN NATIONAL DEVELOPMENT

With the Nigerian land area of 923773 km$^2$ and a coastline of 830 km long, EEZ covering 256, 00 km of the Atlantic Ocean, Nigeria is certainly endowed with natural resources of different types and vast quantities. Thus, there is an enormous resource potential, which if properly developed and managed on a sustainable basis, can support a high level of social and economic development.

Unfortunately, much of Nigeria’s resource endowment is being destroyed or degraded as a result of crude and unenlightened use of space. An example of this is the ocean and its environs where a premium on short term gains is allowed at the expense of the longer term interests of the country, the sustenance of the intrinsic quality of the environs and the natural resources.

Practices in Nigeria that are harmful to the management and utilisation of the resources on a sustainable basis are not different from those practices that exist in many parts of the world that result in pollution of water bodies and wetlands. Other major factors affecting our ocean resources are as follows:

- Poor policy and legal instruments - Policies have been developed in an uncoordinated piece meal fashion and such documents have been directed at individual environmental or resource issues or problems.
• Weak data base - Inadequate data bases remain a major constraint to policy formulation, project planning and implementation of natural resource conservation in Nigeria. Technical data is lacking due to systematic unavailability of an inventory of the natural resources. Without this, to plan for the management and rational utilisation of the resources is difficult. The establishment of a firm data base for planning purposes requires substantial financial investments.

• Law enforcement - Problems exist in enforcing rules and regulations as many laws against, e.g., fishing are wantonly disregarded. It is sad to note that even foreign investors find loop holes in the laws to avoid compliance.

• Institutional Problems - There is hardly any resource that has a well integrated management organisational structure from the Federal down to the local level. At the national level it is common to have different departments and units overseeing different aspects of the same resource without any accuracy or avenue for the co-ordination of programmes and actions.

• Alienation of local inhabitants - Programmes in the past have always alienated the local people from official conservation programmes. There is need for a new conservation ethic that places emphasis on the involvement and participation of local communities in Federal resource conservation programmes.

• Manpower - Nigeria has quite a good number of well trained people but due to political problems involving the use of quota systems to fill important posts, the right people with the right qualifications are rarely put in places where they can contribute effectively to the development of the nation.

Despite the above listed problems, there is an enormous resource potential in the Nigerian marine environment that needs proper management through harmonisation of all practices of extraction, exploration and use. As noted already in chapter 1, the marine environment apart from being a major contributor to the Nigerian domestic fish supply, is also contributing about 900 Mb of oil annually to the Nigerian economy.
The Nigerian marine environment is capable of providing two-thirds of the total catch but there has been a steady decline in fish supply. This is due to the ever increasing population and a consequent increase in demand which in turn is leading to overexploitation. As already indicated in chapter 1, fishing is a substantial contributor of protein but commercial expansion has been slow. It should be noted that the impact of the industry as a source of employment is extremely important in coastal and brackishwater areas and along major lakes and rivers. This helps to maintain small communities hence performing a valuable social role. However, there are good prospects for increasing production taking into consideration the resource endowment.

Mangroves are also a great resource value to a nation. In addition to what has been noted in chapter 1, mangroves hold some more potential uses and environmental functions. These uses and functions have been summarised in table 2.1 as shown below, according to Ruitienbeek (1994).

This reveals an exhaustive manner in which our mangroves can be used. The ever increasing rates of mangrove decimation as well as the resources within, therefore calls for urgent management options. A well co-ordinated inventory of the Nigerian marine environment will reveal more of our numerous resources and the different benefits that can be derived from them. Much emphasis has been on the fisheries and the oil/gas industry. I believe that a move towards good management should not leave out all other resources no matter how small it may be. A well documented inventory is therefore of utmost importance towards establishing an integrated form of management.
Table 2.1: Examples of Uses and Environmental Functions of Mangroves.

<table>
<thead>
<tr>
<th>Sustainable production Functions</th>
<th>Regulatory or Carrier Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber</td>
<td>Erosion prevention (shoreline and riverbanks).</td>
</tr>
<tr>
<td>Firewood</td>
<td>Storage, Recycling of Human Wastes and Pollutants</td>
</tr>
<tr>
<td>Woodchips</td>
<td>Maintenance of Biodiversity</td>
</tr>
<tr>
<td>Charcoal</td>
<td>Provision of Migration Habitat</td>
</tr>
<tr>
<td>Fish, crustaceans shellfish, etc</td>
<td>Provision Of Nursery Grounds</td>
</tr>
<tr>
<td>Medicine</td>
<td>Nutrient Supply</td>
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<td>Honey</td>
<td>Nutrient Regeneration</td>
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<td>Hunting ground</td>
<td>Habitat for indigenous people</td>
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<td>Genetic resources</td>
<td>Recreation Site</td>
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<td>Conversion Uses</td>
<td>Information Functions</td>
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<td>Industrial / Urban Land-use</td>
<td>Spiritual &amp; Religious Information</td>
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<td>Aquaculture</td>
<td>Cultural &amp; Aesthetic Inspiration</td>
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<tr>
<td>Salt Ponds</td>
<td>Educational, Historical &amp; Scientific Information</td>
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<td>Rice Fields</td>
<td>Potential Information</td>
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<td>Plantations</td>
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<td>Mining</td>
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<td>Dam Sites</td>
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Source: EMDI, Mangrove Management: An Economic Analysis of Management Options p 8.

2.2.0 THE NIGERIAN ENVIRONMENTAL POLICY

Much has been written on the present state of the Nigerian Marine Environment and these emphasise the role the government has to play. In reviewing past achievements, it was pointed out that government had in the past given relatively little attention to
the issue of environmental planning and management. But before a conclusion can be
drawn there is need to look into the different plans the Government has established
policy for the environment in general, and for the marine environment in particular.

There has been a dearth of laws and policy statements on the environment in the
country to date. Existing laws governing the environment in Nigeria are more
"international" than "national" in content (Imevbore1991 p 35). There is no
comprehensive national environmental law or policy which addresses the entirety of
the environment for the benefit of the individual and future generations of Nigerians.
This is not to say that Nigeria is oblivious of the international environmental
protection campaigns of recent years.

This can be seen from the fact that;
1. Nigeria is signatory to a number of environmental protection multilateral treaties.
2. Nigeria was among the 80 nations present at the historic UN 1972 Stockholm
   Conference on "Problems of the Human Environment" which addressed the need
   for greater environmental awareness and concern.
3. Nigeria was represented in Nairobi at the May 1982 Celebration of the Stockholm
   Conference which reaffirmed the participating nations' commitment to the
   protection and enhancement of the quality of the human environment.
4. Nigeria hosted the 69th Inter Parliamentary Union IPU Spring Meetings in 1982,
   out of which came a draft resolution on the state of the World Environment. Ten
   years after the UN Conference on the Human Environment at Stockholm.
5. Nigeria was a party to the 1979 Rabat Conference of Ministers and Assembly of
   the Heads of States of the OAU which gave due consideration to the
   environmental dimensions of developmental strategy for the Third Development
   Decade in the African Region.

In addition, Nigeria has acceded to:
1. The International Convention for the Prevention of Pollution of the Sea by Oil 1954 on 22nd April 1968. This prohibits the discharge of oil or oily mixtures in stated zones.

2. In August 1981, Nigeria also acceded to the International Convention on Civil Liability for oil pollution Damage 1969. In the way of implementation, Nigeria has only enacted the Oil in Navigable Waters Decree, 1968, which will be discussed fully later on.

3. Convention on the Continental shelf 1958, on 28th May 1971. This recognises, defines and delimits the rights of states to explore and exploit the natural resources of the continental shelf.

Article 5 provides:

(1) “The exploration of the continental shelf and the exploitation of its natural resources must not result in any unjustifiable interference with navigation, fishing, or the conservation of the sea, nor ease in any interference with fundamental oceanographic or other scientific research carried out with the intention of open publication”

(7) “The coastal state is obliged to undertake, in safety zones, all appropriate measures for the protection of the living resources of the sea from harmful agents.”


5. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972, the 18 April 1972. The treaty seeks to prevent dumping of wastes and other polluting matter into the Nigerian Marine Environment. Article 1 contains pledges of contracting parties to the treaty as follows:
"To promote the effective control of all sources of pollution of the marine environment and—take all practicable steps to prevent the pollution of the sea by dumping of wastes and other matter that is liable to create hazards to human health to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea", (Dumping Convention, 1972).

(6) UNCLOS 1982: Nigeria became signatory in 1982. This contains provisions relating to pollution from sea-bed activities subject to national jurisdiction. As stated in Articles 192, 194 etc.:

“(1) States have the obligation to protect, preserve the marine environment. States have the sovereign right to exploit their natural resources pursuant to their environmental policies and in accordance with their duty to protect and preserve the marine environment. (2) States shall take individually or jointly as appropriate, all measures consistent, with this convention that are necessary to prevent, reduce and control pollution of the marine environment — where they exercise sovereign rights in accordance with this convention”.


These are proof of a national awareness of the need to improve and protect the quality of our environment. The government cannot really claim total ignorance to the most visible pollution and the abuse of and threat to our ecological system posed by man’s activities and technological /industrial developments.

However, legislative focus has been slow in emerging for the management and preservation of a sound environmental system. Thus there has been no comprehensive up-to-date environmental law or policy but there has been some isolated national laws designed to preserve the utility of our air/atmosphere, land and
water. In addition to these, Nigeria has signed or acceded to several environmental protection-related multilateral treaties, which have become part of our laws either by subsequent national enactment or by virtue of customary international law. Hence, S.121 (1) of the 1979 constitution provides that:

“No treaty between the Federation and any other country shall have the force of law except of the extent to which any such treaty has been enacted into law by the Federal Executive Council”

Nigeria is bound by most of the international (environmental protection) treaties to which Nigeria is party and which are regarded as part of our existing laws on the environment. Due to constitutional irregularities, these aforementioned treaties have not satisfied the requirement of S.121 (1) of the 1979 constitution.

As noted earlier the larger percentage of what may be identified as existing laws governing the environment in Nigeria is more “international” than “national” in content. Several researchers such as Awosika and others have suggested the need for integrated management of the coastal environment. The author is of the view that what is needed is an integrated management of the ocean area under the Nigerian jurisdiction which also encompasses the coastal area. This is in agreement with Stella Vallejo of the UN who stipulates that both the coastal and marine areas are linked and therefore should be managed together. This is discussed extensively in later chapters.

Thus far, suggestions of some researchers as identified above have been taken into consideration as evidenced by very recent move towards Sustainable Development of the Nigerian environment but nothing specific has been done on the Nigerian marine environment. However, there is the realisation of the need for sustainable development of our environment in general. This is indicated in the recent policy statements which has not been implemented. The Agency responsible for the
environment, Federal Environment Protection Agency (FEPA) has issued some policy statements saying:

"The goal of the national policy on the Environment is to achieve sustainable development in Nigeria and in particular to:

- secure for all Nigerians a quality of environment adequate for their health and well-being;

But so far there is no comprehensive plan, policy nor management for the Nigerian marine area as defined in chapter 1. The question of how the maritime issues are being addressed brings us to the next section of this present chapter.

2.3.0 THE PLACE OF THE NIGERIAN MARINE ENVIRONMENT

Urgent calls have been made to the Federal Government from several quarters for an integrated management and policy of the coastal zone. Such calls have been made in response to the problem of erosion, which is believed to be caused by climate change and sea level rise. Erosion has been an issue for discussion for quite some years now.

In view of the coastal erosion problem, many authors such as Ibe et al (1984), Fubara (1988), Ibe (1990) and Awosika et al (1991 and 1992) have all requested that the Federal Government put in place some integrated policy and management to embrace the adverse effects and response measures of climate change and sea level rise. However, many government and private organisations have been actively engaged in the different areas of coastal zone management without a formal integrated policy.
Conservation legislation currently in force in Nigeria include:

1. Mineral act of 1946 which affirms ownership of all minerals as property of the country as well vests the responsibility for restoring and reclaiming mined land on the mining companies.

2. Petroleum Act 1969 which established the right of Nigeria to exploit petroleum and gas in Nigeria’s Exclusive Economic Zone.


4. The Sea Fisheries Decree which repealed the sea fisheries Decree of 1971

5. The Exclusive Economic Zone Decree 1978


These include a host of others which relate more to the land area and many international treaties that Nigeria is signatory to.

Hitherto, there is no integrated coastal (nor ocean) planning, policy and Management that can be said to be effectively operational in Nigeria. Despite that, there are several agencies that have been involved in the different aspects of Integrated Coastal Zone Management (ICZM). Some of these include:

- The Nigerian Institute for Oceanography and Marine Research. This was established in 1975 as a national institution and charged with the task of conducting research, gathering information and data on the marine and coastal areas. Since its inception, it has been actively engaged in all coastal and marine data gathering, analysing and monitoring of marine and coastal processes. It is also involved in the Global Sea Observing System (GIOSS) and mans the only Nigerian designated GIOSS station in Lagos.
- The Department of Flood and Erosion control of the Federal Ministry of Works and Housing is usually the implementing agency for all coastal flood and erosion control measures.

- The Nigerian Meteorological Department is solely responsible for collecting meteorological data and forecasting the weather and is currently operating one of the two ozone monitoring stations in Africa.

- The Nigerian Conservation Society

- The Nigerian Environmental Study / Action Team (NEST)

- Institutions of higher learning such as the Universities are deeply involved in research and data gathering and monitoring of coastal processes and activities.

- National committees such as the Ecological Committee, the Technical Committee on flood and erosion, Committee on Earthquake all of which meet periodically to advise governments in the various areas of their mandates.

In addition to these, there are several ministries that have environmental responsibilities. These are as shown table 2.2 below:

<table>
<thead>
<tr>
<th>Federal Ministries</th>
<th>Relevant Responsibilities</th>
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</thead>
<tbody>
<tr>
<td>1. Ministry of Agriculture &amp; Natural resources</td>
<td>Establishment of botanical and zoological gardens, game reserves and wildlife, licenses for exporting wild animals, forestry, fisheries, plant quarantine, soil erosion control.</td>
</tr>
<tr>
<td>3. Ministry of Employment, Labor and Productivity</td>
<td>Factory inspection, labor, safety, health, welfare and education.</td>
</tr>
<tr>
<td>4. Ministry of Health</td>
<td>Public health, port health and quarantine, safety and control of food and drugs.</td>
</tr>
<tr>
<td>5. Ministry of Mines, Power and Steel.</td>
<td>Formulation and implementation of the national energy policy, mines, minerals and quarries, geological surveys and mineral investigations.</td>
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<td></td>
<td>Ministry of Petroleum Resources</td>
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<td>7.</td>
<td>Ministry of Science and Technology.</td>
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<tr>
<td>8.</td>
<td>Ministry of Transport</td>
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<tr>
<td>9.</td>
<td>Ministry of Water Resources</td>
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<tr>
<td>10.</td>
<td>Ministry of Works and Housing.</td>
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<tr>
<td>11.</td>
<td>Ministry of Trade and Tourism</td>
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</tbody>
</table>

Source: Achieving Sustainable Development in Nigeria, FEPA publication p 16.

Funds for all ecological disaster like coastal erosion and flooding are usually sourced from the 1% ecological fund which is in the office of the President, (Awosika 1992). One of the Federal Government’s attempt at ameliorating ecological problems was to
set aside 1% of the Federation Account for that purpose in 1981. This is called the Ecological Fund and is paid into a Special Ecological Fund monthly. This looks a good practical demonstration of the government’s commitment to environmental protection and improvement. A closer look at this has revealed a lot of loopholes and policies that are never implemented just like many of the well known Nigerian environmental programs and policy statements.

The history of coastal resource management in Nigeria shows it is sectorally based. Consequently, national policies are fragmented and haphazard with few linkages between decisions and policies among the different sectors. There is therefore little attention given to adopting comprehensive and integrated approaches needed to manage the multiple use which characterises activities in the Nigeria’s marine environment. This is due to the fact that problems are addressed as they arise and most problems were never anticipated or planned for. Apart from the different problems that arise from utilisation of the Nigerian Marine environment, other problems have confronted Nigeria Marine environment as discussed in chapter 1.

Problems are solved by taking piece meal actions, sudden financial allocations and project by project engineering measure. These are all largely counterproductive as no reasonable principles of integrated management for a sustainable development is ever applied.

In trying to demonstrate a keen awareness of the need to protect Nigerian waters from the adverse impact that emanate from human or technological abuse, Nigeria passed and enacted several national laws to cover the Territorial Waters, Oil in Navigable Waters, the Petroleum Act, Quarries Act, Sea Fisheries Act as well as its Inland Waters Decree.

2.3.1 Territorial Waters Decree 1967
The Territorial Waters Decree as amended in 1971 has extended the Nigerian Territorial waters to cover 30 nm of the coast of Nigeria. This supersedes the earlier claim of the 12 nm for Territorial Waters in the act of 1967. The Nigerian Exclusive Economic Zone promulgated in 1978 also extends 200 nm offshore thus making Nigeria's total marine area to be 61,500 nautical miles, Fenwick (1992).

The section 2 of this decree provides that
1. any act or omission which,
   - is committed within the territorial waters of Nigeria whether by a citizen of Nigeria or a foreigner and
   - would if committed in any part of Nigeria, constitute an offence under that law, and the person who committed it may be subject to section 3 of this Decree and be arrested, tried and punished for it as if he had committed it in that part of Nigeria.
2. The foregoing sub-section
   - shall apply whether or not the act or omission in question is committed on board or by means of a ship or in way by means of a structure resting on the seabed or subsoil, and
   - in case of an act of omission committed by a foreigner on board or by means of a foreign ship shall apply notwithstanding that the ship is a foreign one.

2.3.2 Oil in Navigable Waters Decree 1968

This decree was enacted in keeping with the spirit of the International Convention for the Prevention of Pollution of the Sea by Oil 1954. S.1 (1) states that

"if any oil to which the section applies is discharged from a Nigerian ship into a part of the sea which in relation to that ship is a prohibited sea area, or if a mixture containing not less than 100 parts of oil to which this section applies is discharged from such a ship into such a part of the sea, the owner or master of
the ship shall, subject to the provisions of this Decree, be guilty for an offence under this section”.

S. 2 (3) provides that,

“the minister of Transport may designate any area of the sea outside the territorial waters of Nigeria and outside the areas specified in the schedules of this decree as a prohibited sea area”

for the purpose of protecting the coast and territorial waters of Nigeria from pollution by oil.

2.3.3 Petroleum Decree 1969

Considering the level of petroleum activities in the country, the need to protect the environment while conducting oil operations has been recognised but nothing much has been done by way of implementing specific rules. Though some provisions have been made for protecting the environment in our petroleum laws and regulations, such provisions are very general. There have been no specific environmental standards to tie such provisions to. There are a number of statutory provisions to prohibit or control the contamination and degradation of the Nigerian environment (air, water and land). Within the period of 1981-1985, there was an articulated policy for the mining sector, that required the adoption of measures and methods of extraction that would protect the environment from the harmful effects of mineral exploration. However, Government has actually not been able to promulgate a comprehensive legislation to deal with environmental protection and control issues from a global standpoint.

Neither the petroleum decree 1969 nor the minerals Act 1958, is an environmental Act per se, Each contains statutory provisions that require those who operate under licences and or leases granted by these acts to take precautionary measure that would
ensure that their actions do not degrade the quality of the human and for the ecological environment.

The need for an oil spill contingency plan was identified in 1979 during the first Biennial Seminar on the Petroleum Industry and the Nigerian Delta Environment. As a result of the Funiwa oil well blow out mentioned in chapter 1, all the oil companies in Nigeria were directed to prepare a contingency plan. This eventually led to the preparation and approval of individual contingency plans for the oil companies by the then Petroleum Inspectorate Division of the NNPC (FEPA 1991).

2.3.4 The Quarries Decree 1969

This prohibits any person from conducting quarrying operations on any land in Nigeria or divert or impound water for such purpose except as provided by the Decree. S.8 (3) states every operation for the purpose of extracting any quarriable mineral form a quarry for industrial use in this Decree referred to as a quarrying operation shall be conducted under a lease or licence granted under this Decree. S.38 (1) empowers the Minister for Mines and Power to make regulations for the prevention of pollution of any natural water supply and for the disposal of wastes.

2.3.5 The Sea fisheries Decree 1971

S. 1 provides that:

1. Subject to the provisions of this section, no person shall operate or navigate any motor fishing boat within the territorial waters of Nigeria unless a licence in respect of that vessel has been issued to the owner thereof.

2. Any person operating or navigating or causing to be operated or navigated a motor fishing boat in contravention of subsection 1 of this section shall be guilty of an
offence under this Decree and on conviction shall be liable to imprisonment for one year, or to a fine of $500 for each day during which the offence continues or to both such fine and imprisonment.

Section 8 specifies prohibited methods of fishing: "No person may take or destroy or attempt to take or destroy any fish within the territorial waters of Nigeria by the following methods; that is

- by the use of any explosive substances
- by the use of any noxious or poisonous matter"

The Sea Fisheries Decree of 1992 repeals the Sea Fisheries Act and makes provisions for the control, regulation and protection of sea fisheries in the territorial waters of Nigeria.

All that have been discussed above represents some existing national legislation’s, International Conventions, existing institutions with well intentioned but uncoordinated activities in the coastal zone. There are problems in the management of the Nigerian marine environment. This is particularly so in the areas of public enlightenment, research which is still very much inadequate, reactive legislation instead of proactive and complete reliance on crisis management. There is that bureaucratic attitudes which is a result of too many sectors involved in the affairs of the ocean.

Nigeria has however made a move towards implementing an Integrated Coastal Zone Management Policy by creating the Federal Environment Protection Agency (FEPA) in 1988. The functions of the agency include (FEPA1988):

1. Advise the Federal Government of Nigeria on national environmental policies and priorities and on scientific and technological activities affecting the environment;
2. Prepare periodic master plans for the development of environment on the financial requirements for the implementation of the plans;

3. Promote co-operation in environmental science and technology with similar bodies in other countries and with international bodies connected with the protection of the environment;

4. Cooperate with Federal and State Ministries, Local Governments Councils, Statutory bodies and Research agencies on matters and facilities relating to environmental protection; and

5. Carry out such other activities as are necessary or expedient for the full discharge of the functions of the agency under the decree.

With regard to the coastal zone, FEPA's priority areas include coastal erosion and flood control, abatement of pollution by industrial effluents, global warming and protection of the ozone layer. Specifically, FEPA's marine and coastal area goals are to maintain and improve the quality of the unique environmental resource endowment and physical characteristics of the coastal areas, preparation of ecological master plans to guide the use of coastal areas for diverse and often conflicting industrial and social activities for the continued viability of all aspects and ecosystems.

These are so far the laws, decrees and regulations and institutions meant for the protection of our marine area. It is quite glaring that most of our laws are old. They are out of tune and grossly inadequate with and for our present socio-cultural realities, in addressing our problems of accelerating environmental degradation and resource depletion. There is clearly a priority need to review, streamline and formulate our legislation for environmental protection and improvement. The Law Reform Commission and the Federal Ministry of Justice are to take up this task and develop an integrated, co-ordinated and comprehensive legislation on the environment.
Recognising that the effectiveness of the legislation depends on the degree of compliance, there is need to put in place more effective systems of control, implementation and enforcement procedures. This will be discussed later on.

In summary Nigeria has thus:
- Realised that environmental concerns are common concerns to all.
- Realised the need for sustainable development and the governments inability to conceptualise the environment in a holistic perspective.
- That environment should be addressed in relation to developments that must be sustainable and in trying to pass some policy has
- Stated that: “for sustainable development to be effective, government, community, industry, private firms, and NGOs must work together to plan for it, monitor it and manage it.

As stated before the Nigerian marine environment is sectorally based. Sectoral management does not solve the problem of conflicting interests with regard to the use of the sea.

There is presently too much uncertainties; and we do not have to wait for too long because consequences of user conflict and sectoral management are occurring faster than before. Hence, there is need for practical actions in order to avoid greater consequences.

There is need a safer future for the generations to come whose survival must not be endangered. Therefore there is need for actions now to save our marine resources and installations. There is need for the right machinery to enforce existing national and international laws as well as make good decisions on our common heritage - the ocean and its environs.
CHAPTER 3

3.0.0 THE CONCEPT OF INTEGRATION

"The world we have created today as a result of our thinking thus far has problems which cannot be solved by thinking the way we thought when we created them." (ALBERT EINSTEIN)

3.1.0 INTRODUCTION

The coasts of the world today face increasing problems due to increasing human populations and activities, resulting in deterioration in environmental quality, loss of critical habitats, diminishing levels of fish populations, reduced biodiversity as well as increased risk from natural hazards. Above all these, there are increasing conflicts among economic development, environmental protection, and natural resource management objectives. This has brought about suggestions for integrated ocean management, sea-use planning and some other similar concepts commonly applied today. Not much explanation has been given as to what integration, integrated or coherent management actually means in this context, and is the subject of discussion in this chapter.

In the words of Underal Arild in 1980, to integrate means “to put parts together into a whole”. Every other means geared towards integration then must be involved in this pattern which includes integrated policy and integrated management. All of these involve a situation whereby all the constituent elements are brought together and made subject to a single unifying concept. Three basic requirements for this to be possible are comprehensiveness, aggregation and consistency.
3.1.1 COMPREHENSIVENESS

Armstrong and Ryner (1978), stated that comprehensive ocean water use planning and management is the concept of integrating a growing number of human activities within a water activity arena that has certain natural limitations and inherent values that must be recognized and protected.

This involves management of, for instance, a nation’s fisheries, offshore oil and gas production and marine transport, under a common policy conception. Each of these activities are therefore not treated as distinct and independent of one another, but rather interdependent within a single policy area. The scope of a comprehensive policy can be measured along four dimensions, viz. time, space, actors, and issues (Underdal 1980 p 159). This would include essentially, according to Miles (1994) (class notes), concern for long-term over short-term effects and the entire geographical area for which the consequences of policy decisions as relevant decision premises. It would also include the proportion of actors within a system from whose perspective policy options are evaluated and the range of interdependent issues to be dealt with.

With reference to time factor and with particular reference to non-renewable resources such as fishery, this requirement can be met by adopting exploitation limits such as maximum sustainable yield a situation most applicable to the Nigerian situation.

3.1.2 AGGREGATION

This means basing decisions on some aggregate evaluation of the consequences which have been postulated. It refers to the extent to which policy alternatives are evaluated
from an ‘overall’ perspective rather than from the perspectives of each actor, sector etc. Miles, (1994) (class notes).

The requirement of aggregation is also a search for solution ‘Pareto - Optimal’, i.e. no other solution can be found which would improve the outcome for at least one party without leaving any party worse off. Integration of policy ultimately implies weighing interests and setting priorities. This is most important to Nigeria with her multiplicity of resources and a host of actors and different sectors involved.

3.1.3 CONSISTENCY

This means that the policy objectives and the implementation strategies are in harmony on the vertical dimension and there is agreement among all relevant executive agencies across the horizontal dimension on what constitutes a given policy at a given time. It implies equal treatment of equal cases, i.e. applying the same substantive principles and criteria to all cases in a certain category. It requires weighing interests and setting priorities. It requires weighing costs and benefits of policy options and ensuring stability and sustainability over time. Frequent changes in priorities may lead to serious inefficiencies, Underdal (1980 p162). Changes could come but only as a response to changing circumstances or new information. This in fact, requires a proper strategic planning, (see Action 5 in chapter 6).

A consistent policy or management is one where specific implementary measures conform to more general guidelines and to policy goals. The primary objective according to UNCED is the achievement of an optimal balance between environmental protection and economic and social development, Underdal (1980 p 162).
The concept involves the comprehensive management of both marine and adjacent land environment and of anthropogenic activities therein. It is a new management approach subsuming all sectoral interests in the ocean environment together with its coastal area on the process of exploiting and preserving the ocean resources in the context of sustainable development, Underdal (1980).

3.2.0 INTEGRATED MANAGEMENT IN GENERAL

Agenda 21, of the UNCED (1992), in recognition of the need and importance to protect "Our Common Heritage" (Brundtland Report), i.e., the oceans and their coastal environments, has set forth rights and obligations of the coastal states. It is an international basis upon which to pursue the protection and sustainable development of the marine and coastal environment and their resources. It has been suggested by UNCED that for this to be possible there is a need for new management and development approaches that are integrated in content, precautionary and anticipatory in aim.

Concepts have been suggested by UNCED, one of which is integrated management of coastal areas for sustainable development. This study is not covering only the coastal areas but the ocean area under national jurisdiction as specified by UNCLOS (see chapter 1). More so the link between the ocean and the coast, would require a strategy that integrate the management and protection of both oceans and their coasts.

According to Agenda 21, integrated management should cover all management related activities, data information as well as international and regional co-operation and co-ordination. It requires that coastal states set up an appropriate harmonizing mechanism for sustainable development of coastal and marine areas and their resources at both local and national levels (agenda 21 chp 17 p.309). Such
harmonizing mechanism would need a high-level policy planning body involving consultation, as appropriate with the academic and private sectors, non-governmental organizations, local communities, resource user groups and indigenous people.

Availability of data and information are indispensable for integrated management for sustainable development. UNCED has therefore made it necessary for coastal states to collect, analyze, assess and use information for sustainable use of resources. Data on environmental impacts of activities affecting the coastal and marine areas are also necessary. A database on the intensity and magnitude of changes occurring in these areas over time are needed for assessment and management of coastal areas.

For issues that transcends international boundaries, there is strong need for international co-operation and co-ordination. On a bilateral basis, regional and/or interregional cooperation should be established or encouraged to support and supplement national efforts of coastal states to promote integrated management for sustainable development of their marine areas.

Implementation would need:

- a strong policy making body
- financing and cost evaluation
- scientific and technological means
- human resource development

Detailed scientific information, based on systematic observation, research and modern information management systems, would be important. The use of environmentally safe techniques and methodologies would need to be encouraged. As part of Capacity Building Efforts, it would be very important for coastal states to educate and train scientists, technicians, managers, community-based leaders and users, indigenous peoples, women, youth and fishermen, in the relevance of integrated management to
their activities in support of sustainable development would be very important. Capacity Building efforts by coastal states must ensure that such training is done at local level and they should:

- consult coastal and marine issues with local administrations, the business community, the academic sector, resource user groups and the general public.
- Co-ordinate sectoral programs.
- Identify existing and potential capabilities, facilities and needs for human resource development and scientific and technological infrastructure.
- Promote and facilitate human resource development and education.
- Support “centers of excellence” in integrated coastal and marine resource management.
- Support pilot demonstration programs and projects on integrated coastal and marine management.

3.3.0 PRINCIPLES OF INTEGRATED MANAGEMENT

In general, integrated management has the following principles:

- To provide an analytical process which advises governments on priorities, trade-off, problems and solutions.
- It provides a dynamic and continuous process of administering towards democratically agreed objectives, the use, the development and protection of the ocean and coastal zone and their resources.
- It employs a holistic, systems perspective which recognizes the interconnections between coastal systems and uses. It must maintain a balance between protection of valuable ecosystems and development of ocean/coast-dependent economies. It must set priorities for uses, minimize use impact on the environment, mitigate and restore the environment if necessary, and seek the most appropriate citing of facilities.
• It must seek to establish policies for the equitable allocation of space and resources in the coastal zone providing an appropriate governance for such decision-making and oversight.

• It provides an integration of sectoral and environmental needs which must be implemented through specific legal and institutional arrangements at appropriate levels of the government and the community.

• It promotes awareness at all levels of government and community about the concepts of sustainable development and the significance of environmental protection and the use of integrated management techniques to provide proactive (i.e., incorporating a development planning element) rather than reactive (i.e., waiting for development proposals) positions.

In the course of developing an integrated policy and plan for integrated management by any coastal nation, certain principles as recommended by UNCED in its Agenda 21 would be very useful. These are:

• the precautionary principle
• the polluter pays principle
• use of proper resource accounting
• the principle of transboundary responsibility
• the principle of intergenerational equity
• local empowerment.

The precautionary principle was adopted by the International North Sea Conferences (Couper 1993). It is an anticipatory approach to prevent the degradation of the marine environment. It requires the adoption of precautionary measures, environmental impact assessments, clean production techniques, recycling, waste audits and minimization as well as sewage treatment and comprehensive approach to damaging impacts from air, land and water. These are necessary in order to avoid degradation of the environment and to reduce the risk of long-term or irreversible adverse effects upon it.
The polluter pays principle was adopted by OECD and EC, (Couper 1993). This is to develop economic incentives such as meeting up with environmental costs and applying clean technology.

With regard to resource accounting, it is to be noted that resource development begins with an indication that a resource exists. This indication is obtained through resource assessment. The objective is to determine whether sufficient quantities of a resource exist to sustain production on terms that are acceptable to the state and to the interests making the necessary investment, (Gardner 1994).

The principle of transboundary responsibility is necessary because all marine environmental issues are known to cut across borders of nations. In the light of this, there is need for regional, interregional and subregional cooperation to support and supplement national efforts of coastal states. This would promote integrated management and sustainable development of the coastal and marine areas. Fully aware that fishery resource is a transboundary resources, and in order to broaden the resources base of its industrial fishing fleet to bridge the supply/demand gap, Nigeria has entered into bilateral fishing agreements with a number of West African countries (FAO, 1991). Other bilateral agreements on other transboundary issues such as pollution, have also been entered.

The principle of intergenerational equity emphasizes the need to pass onto the next generation a sustainable environment while yet satisfying our present needs.

Local empowerment involves delegating local management to local jurisdictions. For this S. M. Vallejo, of the UN has suggested that for a more effective management, the coastal area can be under the supervision of the local authority while beyond this but within national jurisdiction should be under the management of the Federal
government. This looks practicable but it requires a strong coordinating body to make it effective.

The essence of all these principles is to achieve sustainable development of the marine environment. These principles seem to satisfy all the requirements of sustainable development which according to the World Commission on Environment and Development,

"is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations".

This makes it very necessary for coastal states to take these principles into consideration while formulating their policies for integrated management.

According to Agenda 21 chapter 17 section 22:

"States, in accordance with the provisions of the UNCLOS on protection and preservation of the marine environment, commit themselves, in accordance with their policies, priorities and resources, to prevent, reduce and control degradation of the marine environment so as to maintain and improve its life-support and productive capabilities."

The concept of sustainable development has gained widespread international acceptance for two basic reasons:

First, the escalating costs of existing development paths with its serious environmental effects and inability to address the needs of the poorest in the society. There is general
agreements in theory of the need to make development sustainable in the long term rather than simply reaping the benefits today at the expense of storing up longer term problems, such as inadequate and polluted water resource among others. While most governments agree in principle, in practice they have been slow to develop policies.

Secondly, sustainable development means different things to different people. Everyone can agree to the idea while pursuing their own interpretation of what it means and how to achieve it. While some see the need for an export led growth as a way of creating wealth to be later used for environmental maintenance and welfare for the poor, others feel that poverty is a major source of environmental degradation and should be addressed. This they say should be addressed in order to alleviate poverty and consequently a healthy environment. These conflicting interpretations of sustainable development has so far delayed action on all functions that can lead to sustainability and any plan for integrated management has been one of those areas that have suffered such delays.

The World Commission on Environment and Development produced the most definitive and authoritative study of sustainable development, arguing that many of the problems of resource depletion and environmental stress arise precisely from the disparities in economic and political power. The commission offered the following set of objectives for sustainable development policies:

1. reviving growth
2. changing the quality of growth
3. meeting essential needs for jobs, food, energy, water and sanitation
4. ensuring a sustainable level of population
5. conserving and enhancing the resource base
6. reorienting technologies and managing risks
7. merging environment and economics in decision making
The report proposed 5 strategies.
- Transforming attitudes and practices
- building a global alliance
- empowering communities
- integrating environment and development
- stabilizing resource demand and population
- conserving variety of life

Integrating environment and development has not been a habit in the past as already noted. If development goes on with utter disregard for the environment (which has been the usual practice), then in time a heavy price has to be paid. The need to limit population growth within the constraints of current resource availability given present levels of social organization and technology, makes good sense as people are able to have reasonable quality of life. Conserving the variety of life is a moral virtue in itself and a hedge between humanity's current needs and potential future benefits. This can only be achieved involving the communities, building a global alliance, and most of all by integrating both the environment and development.

Traditional approaches tend to be sectorally oriented. They tend to be sectorally fragmented in character and usually not based on an ecosystem approach, i.e. an approach to conservation of species, (see chapter 5). This is because a single purpose use emphasized generally precludes the consideration of negative impacts on other sectors. For example, the introduction of trawlers for fishing could cause severe resource depletion, and reduce catches. This would ultimately reduce income from most traditional and industrial fisheries.

Similarly, extensive reclamation and/or decimation, of lowland swamp forests can bring about the destruction of large areas of tropical rain forests. This approach does not promote efficient coastal or ocean resource use significantly affecting fishery
breeding grounds. Conversely, improving fish exports, conversion of coastal land uses into single use brackish water shrimp ponds, can bring about severe coastal erosion and decline of water quality as has happened in North Java in Indonesia, Lagos- Witte (1994). This can affect adversely residential populations and industry that need access to a clear uncontaminated water resource.

Integrated management focuses on three operational objectives:

- Strengthening sectoral management, for instance through training, legislation and staffing
- Preserving and protection of the productivity and biological diversity of coastal ecosystems. This is mainly through prevention of habitat destruction, pollution and over exploitation.
- Promoting regional development and sustainable utilization of coastal resources.

In general and with particular reference to the need for training, legislation and staffing, integrated management for sustainable development requires sustainable institutions, which means a staff both trained in professional competence and willing to meet the challenge. For regional developments and for issues that transbound national territorial waters such as pollution, there is need for regional co-operation.

The overriding impetus for the design and implementation of integrated management is as a necessary method to achieve sustainable development and this represents the predominant thrust of Agenda 21.

From what has been discussed so far one can broadly see that there is great need for integrated management of our hitherto sectoral management approach to development, the environment and its resources. For this to be possible GESAMP has indicated that there is need for the adoption of an integrated and comprehensive management strategy, based on common principles, agreed goals, and scientific
methods. This is the only way the parallel aims of further human development and environmental protection can be satisfied.

Whatever strategy we adopt in solving our problems, our main goals should be:

- To protect the marine environment against the adverse effects of human activities so as to conserve marine ecosystems and to safeguard human health while providing for rational use of living and non-living resources.
- To manage human activities and social and economic development in a manner that limits contamination of the marine environment by substances and wastes, thereby ensuring that the viability of marine ecosystems and the legitimate uses of the sea are sustained for the benefit of present and future generations IMO/FAO (1991).

There would be some difficulties in achieving or implementing integrated management when one considers the complexity of the oceans and the uses it supports especially with regard to the Nigerian situation as seen in chapter 1. Integrated management is often seen as a lofty ideal because even defining a possible organizational structure, or an operating procedure whereby diverse ministries can engage in an integrated process, is an auspicious task. There are other problems of bureaucratic restraints on cooperative efforts of government ministries and their subordinate administrations and agencies. This usually is in the area of planning and execution of functions by these administrations. These limit the hope for achieving integrated management. However, despite these problems, achieving integrated management of the marine environment is the necessary approach to achieve sustainable development of a nation's coastal zone and marine regions, (Sampson T, 1995).

Another problem facing integrated management, could be lack of an ideal institution to base management on but there are a lot of options as far as institutional arrangements are concerned as we shall see shortly. This is because there have been identified cases of successful management programs in different places which can be
used as models. Thus a look into some pioneering initiatives to such effect as exemplified by the Netherlands, Hawaii, Australia and Indonesia would perhaps offer some good ideas on how integrated management of the marine environment can be achieved in Nigeria. Really, integrated management, the plan the policy the implementation all seem a difficult task but it is certainly quite possible.
CHAPTER FOUR

4.0.0 INTEGRATED OCEAN MANAGEMENT:
CASE STUDIES

THE NETHERLANDS

THE UNITED STATES OF AMERICA

(HAWAII)

THE GREAT BARRIER REEF OF AUSTRALIA

EAST ASIA: INDONESIA

4.1.0 INTRODUCTION

An ideal solution of exploiting ocean with regards to its uses and exploitable resources, is full integrated management. This involves harmonization of coastal and ocean planning and management within a formulated national integrated marine policy.

Some good pioneering work has been done in this aspect by some selected areas.

These are:

1. The integrated ocean management plan by the US state of Hawaii which is very similar to the state of Oregon also in the US.


3. The Great Barrier Reef of Australia and

4. Indonesia in East Asia which happens to be a developing country like Nigeria.

Marine planning and management is a newly emerging specialization. Much has been written about it in theory but very little has been achieved in practice; at least in
accordance with UNCED's requirement of integrated management of sea areas i.e. the EEZ. There are however some exceptions.

Having examined integrated management from a theoretical basis in chapter 3 an examination of the application to these principles is intended to be instructive. A number of places which bear some resemblance with Nigeria have been chosen for case studies hoping that these can be adopted as models for Nigeria.

4.2.0 THE NEED FOR INTEGRATION

The North Sea Harmonization Policy Plan is based on the findings of the world Commission on Environment and Development. It contains some of the strongest language seen in an official document on the environment (Stark 1992).

The Dutch are certainly not alone in being alarmed, nor in finding that the Brundtland Report helped them to rethink their policies. Their plan is known to be a way ahead of all other policy plans. The Dutch report is one of several official responses to our common future. This approach to integrated management is described in this chapter along with some other recent noteworthy plans. Steps taken by the governments of Hawaii, the and recapping Australia, the Great Barrier Reef, are briefly described here to illustrate the range of issues touched by Sustainable Development.

4.3.0 THE NETHERLANDS

The Netherlands has developed its North Sea policy over the past 10 years along lines which could be described as 'Integrated' even though the Netherlands government itself has always maintained that it did not wish to develop an integrated approach towards the management of their marine realm. Although, the Netherlands has had its harmonization of the North Sea Policy since 1975 it was only established in 1984.
This was followed by the policy plan of 1989 - 1992 and has since been replaced by the water system management plan of 1995, (Peet 1993 p 601). Part of the process the Netherlands followed has been discussed later. The Netherlands engage in oil production ashore and offshore and have busy ports and oil terminals.

Though the Nigerian Ports are not as developed as those in the Netherlands and would not be expected to be as busy, in its own capacity the Nigerian port is very active and important to the nation’s economy. Similarly, Nigeria has offshore oil production and so would learn from the experiences of the Netherlands.

Just as the North Sea is important to the Netherlands, the Atlantic is of similar importance to Nigeria. But, while the Netherlands have detailed plans for the North Sea, as it is of great economic importance, the Nigerian Government does not have such detailed plans for the Atlantic. Even where fragmented plans exist, they are seldom implemented. Having examined the plans of the Netherlands, it is hoped that some of the management and implementation procedures and practices can be seen to be relevant to the Nigerian situation.

The Netherlands share the North Sea together with other nations - the United Kingdom, France, Belgium, Germany, Denmark and Norway, (fig 4.1).

The North Sea occupies the area between 4°W and 12° East Longitude, and between about 49° and 62° North Latitude. The whole North Sea taken from the Strait of Dover to a line from the Shetland Isles to Berge has an area of about 572,000 km². The total length of the Netherlands coast is about 390 km with an average water depth of 100m, (North Sea Atlas 1992 p.1-4).

The Netherlands sector of the Continental shelf has an area of about 57065 km² and this includes the seabed and the subsoil beyond the territorial sea, up to a distance of
200 Nautical Miles measured from the coast baseline. The North Sea is connected to the Baltic in the East, to the Atlantic Ocean in the North and via the English Channel also to the South, North Sea Atlas (1992 p.2).

4.3.1 SIGNIFICANCE OF THE NORTH SEA

The North Sea is very actively used. With regard to shipping it is the access route to the large ports of Rotterdam, Antwerp, London, Bremen, Hamburg and the Baltic Ports. Ships carry most diverse raw materials and products as well as crude oil and ore and general cargo from and to the major industrial centers of North and Western Europe. It is the most intensively navigated sea in the world.

Fishing is one of the major activities with about 1500 peoples in the Netherlands earning their living directly or indirectly from sea fishing. The Netherlands records an annual catch of some 2.7 million tons or 120 kg/hectare well above the world average of 1.7 kg/hectares (ICONA 1991). Offshore oil and gas production is a relatively recent activity.

Other user functions are recreation, extraction of sand and gravel, military exercise, underwater archaeology, marine research, discharge, dumping and incineration of waste materials and eventually, it is expected that the North Sea would play a part in the generation of energy by wind and water power.

The various activities taking place in and on the North Sea are of importance to The Netherlands. They contribute to the national income, promote employment or in other ways benefit the prosperity and well being of the nation. For the Netherlands, the sea is therefore an indispensable part of nature as far as people are concerned. It is also economically important as a transport route, as a mineral extraction site, fishing and as an area of recreational pursuits.

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For many decades now, the major cities and vast industrial complexes on the coast and along the rivers have discharged large quantities of waste into the North Sea. This is a major concern of the government and the various ministries involved with the North Sea matters. This is in addition to the fact that the various uses are in conflict with one another.

Striking a proper balance between the uses to which the sea is put, in relation to the environment, is therefore considered very important in the Netherlands. This is because, the government is aware that further development of the uses made of the sea will create the possibility of new interactions and thus mutual hindrance. To prevent this happening is in the interest of both the users and the environment. Such prevention will reduce the probability of damage occurring to people, equipment, materials, the environment and development projects. Striking a balance between conflicting uses is seen as the only way out.

The government then sought to take action at both regional and national level. At the regional level, the North Sea coastal states have adopted many conventions such as the Bonn Agreement, Copenhagen Agreement and Lisbon Agreement. These apply to the North Sea or to the north-east Atlantic. Some of these conventions relate to ocean dumping, land based pollution and pollution combating. On the national level these international solutions were implemented in domestic legislations of the North Sea coastal states.

In addition to the above measures at the national level, some policy measures have been developed and good implementation procedures coupled with well structured institutional framework are being used to adopt the National North Sea Policy for the Netherlands.
Instruments for the harmonization of the North Sea Policy include:

- Issuing a plan on the harmonization of the North Sea Policy in 1982. This was for better co-ordination of the numerous activities and the use of space undertaken by different government departments which were at the time sectoral, i.e., dispersed and uncoordinated. It was in other words a step towards integrated management, (Ton Ijslstra, 1991).

1. Establishing in 1984, and as instruments for the harmonization of its North Sea Policy, the following:

- a policy framework
- an action program
- an institutional framework

4.3.2 POLICY FRAMEWORK

This systematically states North Sea Policy, from general principle to detailed objectives and parameters. New policy intentions are always evaluated in the light of this policy framework, resulting in wide-ranging co-ordination. The policy objectives are formulated along five “facets”. These are economic, spatial, environmental, social/cultural/scientific and international/administrative lines.

A. THE ECONOMIC FACET

In the economic field the government’s efforts are directed towards the safe and efficient use of the various opportunities offered by the North Sea. These activities are desirable because they make the greatest possible contribution to such aspects of the national economy as employment and economic growth. Thus the harmonization plan contains economic objectives in respect of shipping, commercial fishing, extraction of minerals, and generation of power.
B. THE ENVIRONMENTAL FACET

One of the most important objectives in the Netherlands policy framework is related to the environmental protection of the North Seas valuable ecology by using caution and preventive action.

The most important problem areas are the potential damage to the natural environment, fishery and recreational activities by pollution, the lack of knowledge concerning the effects of discharges of waste substances on the marine environment and the functioning of the marine ecosystem in general as well as the transfrontier nature of environmental pollution.

It aims at preserving or restoring as far as possible the natural range of species and organisms within the aquatic ecosystems.

In this respect the ecosystem of the North Sea must be protected from irreversible damage as a result of human activities which could affect major uses of the area. The "standstill" principle is applied implying no deterioration in the present quality of the environment and a substantial reduction in the input of nutrients and substances that are persistent, toxic and liable to bioaccumulate.

There is a cohesive Water Quality Plan, which is regularly corrected on the basis of new knowledge and developments. Daily practice involves necessary intensive checking of the environmental rules and laws concerning the region.

The last planning period of the North Sea Water Quality Management Plan has since run to an end and has been succeeded by the North Sea Water System Management Plan 1991-1995 its is to promote the long-term preservation of ecological assets in
Fauna of the North Sea
Relative changes in the flora and fauna of the North Sea
the while taking account the various problem areas identified in the harmonization plan.

The North Sea Water System Management Plan (N.S.W.S.P.) is an integrated management plan for the Dutch part of the North Sea that offers a coordinated, strategic approach to problems concerning the pollution and disturbance of the sea. It was adopted in 1992 by the Dutch Government and puts into effect policies already laid down in various governmental policy documents.

The integrated management plan can be said to be made up of the water system approach and the multifunctional approach, both of which deal with issues concerning the harmonization of the different sectors.

The central objective of the N.S.W.S.P. policy is “the improvement of the North Sea water quality such that the sustained conservation and development of ecological values of the North Sea is promoted and maintained, in harmony with the socially desirable uses of the North Sea” (NSWSP 91/95 p. 2).

The Plan consists of an overview of the pollution load and disturbance pressures borne by the sea, a set of policy measures, and objectives for the plan years 1991-1995 and for the longer term. The effectuation of the plan is intended to allow the North Sea water system to reach eventual equilibrium with the anthropogenic uses of the north Sea and to ensure that such uses do not impair the water system. Water system in this context means “an interconnected and functional aggregate of the water, the sea bed, the coast, the plant and animal communities that occur in these areas, and the associated physical, chemical and biological characteristics and processes” (NSWSP 91/95 p 2).
The problem of the North Sea has been represented by a figure referred to as "Amoebae" (fig 4.2). It displays the current situation of the North Sea in comparison with the situation in the 1930s. The 1930s was chosen because it is assumed that at that time the North Sea was unpolluted and much less intensively exploited than it is at present.

The Amoebae figure, makes it clear how disruptive the human uses of the North Sea have been over the last sixty years. Long-lived organisms are apparently losing ground to short-lived organisms; the biological system is incomplete and its composition unbalanced. Continuation of current practices, including pollution, will prolong this disruption and offer no guarantee for sustainable development (NSWSP 91/95 p. 2).

At that time there were large scale algal blooms, impairment of the marine mammals reproductive capacity and an imbalance in age composition of fish stocks.

The plan therefore has designated an area as an "Environmental Zone" (fig 4.3) where a special level of protection is given to a large part of the North Sea most ecologically valuable areas. It is anticipated that the introduction of stricter regulations with regard to certain activities in the environmental zone will further reduce disturbance and pollutant loads, thereby contributing to environmental protection, recovery and natural development - not just within the Environmental Zone itself but throughout the North Sea.

This protected zone comprises the Netherlands coastal waters, the Frisian Front and the Klaver Bank. These areas have been collectively entitled the "Environmental Zone." It was noted that target state can be attained only if the ultimate effects of human economic activities stay within these environmentally safe limits.
It has been resolved that within the zone the best available technologies will be employed to prevent further pollution of the North Sea. A higher protection level will be accorded this area by:

- Disallowing certain human activities including fishing.
- Creating a small artificial reef - it’s effect on the water system will determine whether or not a bigger one should be created.

The most important human use functions are shipping, offshore mining, fishing fleets, recreation, surface mineral extraction and military uses. All have taken forms that guarantee ecological conservation and development. There is coexistence of a sustainable protection of ecological values and a broad variety of human activities. Excessive algal growth is now rare while the fish population is healthy. The Extraction of oil, gas and sand is subject to adequate environmental and safety regulations. There is a clean coast for recreation that encourages tourism and bird populations are stable and varied as are the benthic communities.

The central objective of the North Sea water system policy is:

"the improvement of the North Sea water system quality such that the sustained conservation and development of ecological values of the North Sea is promoted and maintained, in harmony with the socially desirable uses of the North Sea".

There is comprehensive use of space on the North Sea. While some uses occupy space permanently or for a long period e.g. placing of offshore installations other uses occupy space in a manner that varies in time and place e.g. shipping fig. 4.4 below.

Fig 4.5 gives a picture of the use of space on the North Sea as at 1975 and fig 4.6 gives a picture of the present use of space. The picture has become more complicated
since 1975 due to introduction of new uses, but the greater part of the change has been caused by the increased intensity of the existing uses. Here the objective of the government is "to seek a harmonious balance between the various activities taking place in the North Sea area, now or at any point in the future, limiting and if possible preventing any mutual hindrance. This is approached partly with the aim of enhancing safety at sea. (See pages 90-92 for figs. 4.4, 4.5, 4.6 above).

Conflicting interests relating to permanent or localized uses of space such as submarine pipelines and cables, extraction, platforms and land reclamation are taken into consideration. Shipping interests and other uses such as offshore mining have been considered by providing traffic separation schemes while mining is carried out without causing a hindrance to shipping.

4.3.3 ACTION PROGRAM FOR THE HARMONIZATION OF THE NORTH SEA POLICY.

This is the second instrument of the harmonization policy containing an over view of all actions which facilitate the execution of the harmonization plan.

Each action point contains a description of the activity mentioned, a report on the current situation, any further action that needs to be taken, a time schedule, and a statement identifying the initiating department and other departments which are to participate. This approach ties in closely with the policy framework, and thereby promoting understanding of the policy and the relation between policy proposals and concrete action.
4.3.4 INSTITUTIONAL STRUCTURE

This is the third instrument of the Netherlands Harmonization Policy Plan for Integrated Management. It consists of five components (fig 4.7).

The Coordinating Minister for North Sea Affairs is the Minister for Transport Public Works and Water Management and is designated to take responsibility for the coordination of the North Sea Policy.

The Minister for Economic Affairs remains responsible for the activities in the field of offshore exploration and exploitation, while the coordinating minister is responsible for attuning these offshore activities insofar as they relate to responsibilities of other ministries.

The Ministerial Council On North Sea Affairs (MICONA) takes important decisions on the North Sea. It meets to take important decisions or to solve eventual problems which could not be solved in the preparatory phase of the policy.

Interdepartmental Coordination Commission for North Sea Affairs (ICONA) was established in 1977 as a forum where all formal decisions are taken and where coordination takes place. It is made up of representatives of all departments save for the Development Aid Department.

The North Sea Commission is a sub-commission which serves as an advisory organ of the Ministry for Transport, Public Works and Water Management. It is composed of representatives of different sectors interested in the North Sea such as the fishermen, shipping, and environmental interests with a second category made up of independent experts. The interest groups have a consultative structure and articulate their wishes through the Water Management Commission for the interest groups. The
interest groups are made up of water managers, fishermen, environmental groups, offshore industry etc.

Expert Commission on Water management and North Sea Affairs (consisting of experts) exercises democratic control over the functioning and the progress of the North Sea Policy. It is also in position to convince the Government that certain policies and plans should be pursued or stopped. It acts as a forum through which interest groups air out the views and to a certain extent as an avenue for the members of parliament to express the wishes of the interest groups.

According to Vallejo of the UN the institutional framework seem to provide an adequate basis for promotion of the ideal of integrating the ocean management initiatives with Coastal Area Management.

CONCLUSION

The Harmonization policy of the Netherlands looks quite comprehensive and coherent. One of the most important factors in this type of set-up is to keep all concerned well aware of what is happening in other sectors, and be well attuned to one - another's activities in responsibilities for the North Sea. This objective appears to have been achieved because the different governmental agencies seem well aware of each others' policies.
The harmonization policy has a strong political basis in parliament. It provides the fixed commission for the seas with an annual update in respect to the most important activities on the North Sea. The annual progress reports give clear and detailed
information enabling the commission to discuss all aspects with the responsible Minister.

4.4.0 THE STATE OF HAWAII

In the US, whilst there is no such thing as an overall comprehensive and integrated EEZ policy at the Federal Level, it is true that the US has used several policy instruments in practice which are extremely useful for an integrated approach and that several states have embarked on the course towards more integrated policy plans for the waters off their coasts. The US is a leader in many respects in their pursuance of integrated management to achieve sustainable development.

Due to the size of the US, studying this case at the national level would be quite complicated. Since most coastal states in the US have their own plans for the management of their adjacent marine environment a look at one of two progressive states activities can be valuable. The two States of Hawaii and Oregon are known to have very good plans for their ocean area. Hawaii is chosen for review in this chapter.

The US can be compared with Nigeria in terms of having federal structure, a feature that is common to both and it can be assumed that planning and management at state level could be similarly applied within the Nation of Nigeria.

4.4.1. HAWAII OCEAN RESOURCES MANAGEMENT PLAN - HAWAII OCEAN AND MARINE RESOURCES COUNCIL (January 1991).

Hawaii is a place with a culture and lifestyle wedded to the ocean. It is an archipelago extending 1,523 miles within a zone of deep pristine ocean harboring an abundance of
The first task in developing the integrated management plan was to carry out a comprehensive study by the Governor's Task Force on Hawaii marine Affairs. This was done in 1969 and culminated in the creation of a Marine Affairs Co-ordination Office in the Governor's Office in 1970. Subsequent studies by the Governor's Advisory Committee on Science and Technology brought about the creation of Hawaii's Coastal Zone Management Program based on the 1988 Ocean Resources Management Act, (HORMP 1991).

Hawaii initiated its 'Comprehensive Ocean Management' process in early 1980 and by 1985 the State of Hawaii Ocean Management Plan was published but due to some reasons the plan was not fully adopted. In 1991, the State of Hawaii published its Ocean Resources Management Plan with the 1985 Ocean Management Plan serving as a starting point.

The central theme of the 1991 Hawaii Ocean Resources Management Plan is what is called 'ocean stewardship' has a geographical scope that covers its EEZ. This stretches from the coastal zone out to the limit of 200 mile EEZ.

The government has in the past, used the sector-specific approach to ocean management. This was adequate but with a changing economic structure and legal regime, its weaknesses have become apparent and the plan has to be designed to address five-specific critical ocean and coastal resource problems and to better anticipate and ameliorate potential problem.

The five major problems were:

- Poorly coordinated and inadequate current system of managing ocean and coastal resource.
- Existing mechanisms and procedures for resolving ocean and coastal uses and regulatory conflicts were inadequate.
• Existing enforcement systems for ocean use laws and regulatory conflicts were inadequate.

• Public participation in and awareness of ocean and coastal resources, as well as their management, were lacking.

• Ocean and coastal management programs were reactive and issue-driven rather than anticipatory.

To address these problems, there was a call for a more integrated and comprehensive management approach, increased funding, better information and implementation as well as a more proactive approach to resource management.

Process of making the plan involved setting up a planning team composed of council staff and consultants whose first task was to prepare a draft plan to be submitted for public input and comment. In addition to these they were to:

• Identify critical issues affecting the ocean

• Prepare technical papers

• Run technical workshops with experts in each of the ten resource sectors

• Suggest policies

• Implement actions

All of these were based on a survey to identify existing state of the ocean and coastal program activities, personnel and funding resources, together with related laws, rules and regulations, (HORMP 1991).

The designation of a high policy level mechanism falls within the Hawaii Ocean and Marine Resources Council which is a cabinet-level body created to advise the Governor and State Legislature. It is charged with formulating the Hawaii Ocean Resources Management Plan which includes a unified set of Ocean policies for the State while serving as a forum for multi-level government agency co-ordination and public participation, (MacDonald, Clark and Shannon, 1991).
The plan is based on two principles:

1. It was realized that activities on land directly impact the health and vitality of the ocean environment coupled with increasing and changing uses of the ocean.
2. It was accepted that the government bore a responsibility for its enormous ocean and coastal resources and need existed for using them wisely to pass them on to future generations.

The issues addressed in the plan were
- balancing economic activities with resource protection,
- managing use conflicts, and
- identifying where/when commercial interests could be permitted to use or manage public resources.

The central theme of the 1991 Hawaii Ocean Resource Management Plan is ‘Stewardship’ - a concept which recognizes that the present generation is entrusted with the care and management of the coastal environment and its resources on behalf of generations yet to come. This is in line with the concept of sustainable development which in this circumstance builds on the concept of conservation. Conservation as defined by the International Union for the Conservation of Nature and Natural Resources (IUCN) is the management of the biosphere so as to yield the greatest benefit to present generations without reducing its potential to provide for the needs of the future generations, (HORMP 1991).

Hawaii, has long recognized the dynamic linkages among the open ocean, nearshore, coastal and terrestrial environments which are interconnected through ocean currents, wind and runoff, exchange of nutrients and movement of flora and fauna” (HORMP 1991). Managing this naturally integrated ecosystem therefore requires a strategy which also is integrated, to ensure that one resource management plan is consistent with another and guaranteeing that one resource use is compatible with another. The
Co-ordination between federal, state, county, public and private interests is necessary to achieve this integrated management.

Major policy concern the following:
- research and education
- ocean recreation
- harbours
- fisheries
- marine
- ecosystem protection
- beaches and coastal erosion
- water management
- aquaculture
- energy and marine minerals

These policy objectives support Hawaii's development and maintenance of a comprehensive, integrated management system that ensures the enhancement and sustainment of its ocean and coastal resources (HORMP 1991).

A recommendation for a new government structure to accommodate an Office of Marine and Coastal Affairs within the Governors Office was made. In addition to this, a number of priority ocean management recommendations were made by the task force to the coordinating office in the office of the governor as follows:

- Implement a regional planning approach
- Improve the information base concerning the plan
- Establish carrying capacities i.e. the limit the environment can take in terms of impacts from human activities
- Develop conflict Resolution Procedures between users
- Enforce ocean use Laws and Regulations
- Anticipate critical issues
The plan recommends the establishment of an office of Marine and Coastal Affairs in the Governor's Office. This Office would be the central authority to perform such function as planning and policy development, inter-agency co-ordination, communication facilitation and conflict resolution.

Two major implementation approaches are recommended:

- regional approach that would not preclude or supersede existing States and County planning and management processes, but rather would be an extended component of these efforts.
- Sector specific approach with activities which would be evaluated and prioritized with designated lead agencies and coordinated with Federal, State and County agencies, (MacDonald, Clark and Shannon, 1991).

From this one can observe that implementation of these management guidelines will require strong political will by government as well as better understanding and support by the general public and private sector. It is the duty of the Hawaii Ocean and Marine Resources Council to plan and to ensure implementation.

This is a typical example of a state-level program to plan for a coordinated, comprehensive ocean management both within the territorial sea and beyond within the National jurisdiction. This plan has been “successful because of the effective use of state officials, local leaders and citizens activities in one forum” (Sorensen and Hershman, 1990).

But according to Peet, it is far too early to assess the effectiveness of this Ocean Plan though for now it looks quite comprehensive and coherent.
4.5.0 THE GREAT BARRIER REEF OF AUSTRALIA

The most acclaimed and complicated management plan ever devised and implemented is the one that governs Australia’s Great Barrier Reef Marine Park (GBRMP). The Great Barrier Reef (GBR) is by far the largest marine park in the world, (Hinrichsen 1990 p 16). Technically, the region is not a park but rather a multiple-use management system. It is a typical example of the management of a Large Marine Ecosystem, (LME). (See chapter 5).

Although there are no reefs in Nigeria, the excellence in the management of this marine area which is of great importance to Australia is something other nations may learn from. Circumstances leading to its establishment are not different from the existing problems facing the Nigerian marine environment.

For instance:

1. There has been public outrage at the prospect of offshore drilling which was the driving force behind the formation of the GBR park. The Great Barrier Reef Marine Park Authority was established to administer the park with broad powers to regulate and prohibit activities within its borders.

2. Land-based activities threatened the integrity of the region’s reefs just as land-based activities have major influence on the Nigerian Marine environment.

3. Managing in sustainable development requires comprehensive planning to ensure successful attainment.

4. Finally, the steps taken from its formative stages to implementation are worth emulating by any nation whose aim it is to undergo integrated management for a sustainable development of a nation’s marine environment.
4.5.1 SUSTAINABLE DEVELOPMENT OF THE GREAT BARRIER REEF OF AUSTRALIA AS A LARGE MARINE ECOSYSTEM.

This is one of the first pieces of legislation in the world to apply the concept of sustainable development to the management of a large natural area. It has been noted that the approach has been successful because reports have shown that overexploitation of the Great Barrier Reef has largely been prevented, (Peet 1993).

The Great Barrier Reef is the largest system of corals and associated life forms anywhere in the world. It is encompassed in a marine park within the GBR Region covering an area of about 350,000km² on the Australian Continental Shelf (fig 4.9). The reef stretches for almost 2000km along the north and eastern coast of Queensland. The Reef is narrow in the north, diverse in inhabitants with more than 1,500 species of fishes (GBRMPA, 1981), six species of turtles, 4000 different kinds of molluscs and is visited by more than 240 species of birds (Kikawa, 1976).
Figure 4.9  The Great Barrier Reef of Australia

Great Barrier Reef Region of Australia.
Reef related activities include commercial fishing and tourism, recreational pursuits, traditional fishing, scientific research and shipping all occur within the GBR but oil drilling is prohibited.

Resort tourism is highly promoted with resort guests making extensive use of reefs and water for recreational activities including fishing, diving and snorkelling, water sports, sightseeing and collecting.

The reef has over the years faced main threats such as combination of improper land management, especially deforestation of coasts and uplands, and outright destruction through coral mining and blast fishing both of which are highly destructive.

There are conflicts among the various users of the reef and the surrounding area and between those who wish to see the reef maintained in its pristine state forever. A major conflicting use is bottom-trawling for prawns. Runoff from islands and the mainland contains suspended solids, herbicides, pesticides nutrients and other materials. These create a need for a type of management that is sustainable. This has prompted the establishment of the GBRMP Act by the GBRMP Authority. In doing this, it has applied the concept of sustainable development.

The GBRMP Authority believes that any use of the reef or associated areas should not threaten the reef's essential ecological characteristics and processes. Activities depending on the reef's renewable resources should generally be held at or below maximum sustainable intensities indefinitely. This belief has led the authority to adopt the following primary goal:

"To provide for the protection, wise use, understanding and enjoyment of the GBR in perpetuity through the development and care of the GBRM Park" (GBRMPA, 1991 p.7).
Figure 4.10  Indonesian Major oil/gas fields

Figure 4.11  Oil Production in Indonesia

OIL PRODUCTION ON INDONESIA

<table>
<thead>
<tr>
<th>Year</th>
<th>MBOPD</th>
<th>% Offshore</th>
<th>% Onland</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>1194.4</td>
<td>42.8</td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>1252.5</td>
<td>38.4</td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>1234.5</td>
<td>37.9</td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>1158.7</td>
<td>34.6</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>1241</td>
<td>33.7</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>1339.5</td>
<td>36.5</td>
<td></td>
</tr>
</tbody>
</table>

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Not only the physical aspects of the reef need to survive, administrative arrangement also must be durable. For this to be, there is need for public support from which government support is derived.

The Great Barrier Reef Marine Park was formed in 1975 by an Act of Parliament which had the support of all political parties. Public outrage at the prospect of offshore oil drilling and mining on the reef was the driving force behind the formation of the park. It was established to administer the park, with broad powers to regulate and prohibit activities within its borders. The Act gave the Commonwealth Government the right to interfere in land-based activities that might threaten the integrity of the region's reefs.

The first action taken by the GBRMPA towards sustainable use was to declare it a marine park. Realizing that a sustainable management would need comprehensive planning, the following steps were taken in quick succession:

- A complete resource inventory were taken and highly detailed maps of the entire reef system were drawn up.
- Questionnaires were sent out to individuals and organizations that used the reef regularly to know how the reef was used, where and by whom.
- Public meetings and information campaigns were held. This was done to gain the support of the public and interest groups (e.g., recreational and commercial fishermen, and divers) for their proposed zoning plans.
- The entire reef was divided into management zones based on the available information. (GBRMPA 1991).

The division into management zones was to facilitate management of this vast areas. This division was into huge management sections running from north to south. Within each section, the Authority designated five different kinds of management zones each prohibiting or permitting certain kinds of activities. These zones are as follows:
General Use Zones: These are all-purpose zones in which most activities, other than mining, drilling and bottom trawling, are permitted.

Marine National Park A Zones: These are a kind of recreational zone where a variety of activities are permitted, including general recreation, trolling for pelagic species, line fishing, and research.

Marine National Park B Zones: These are a “look but don’t touch” zone. All fishing is prohibited so that people may appreciate and enjoy the area in a relatively undisturbed state.

Scientific Research Zones: As the name implies, these zones are limited to scientific research, and

Preservation Zones: In these zones, no activities are allowed, with the exception of special scientific research which cannot be carried out anywhere else.

It is to be noted that the only activities that are not permitted in any part of the Barrier Reef are oil exploration, mining, littering, spear-fishing with SCUBA gear, and the taking of large specimens of certain species of fish.

The framework for planning and management of the Great Barrier Reef is provided by sectional zoning plans. A typical zoning plan regulates the purposes for which the Reef may be used or entered in accordance with the following objectives defined in the plan:

- Conservation of the GBR
- Regulation of use of the Marine Park so as to protect the GBR while allowing the reasonable use of the GBR Region.
- Regulation of activities that exploit the resources of the GBR Region so as to minimize the effect of those activities on the GBR.
• Reservation of some areas of the GBR for its appreciation and enjoyment by the public.
• Preservation of some areas of the GBR in its natural state undisturbed by man except for the purpose of scientific research.

To make the program successful much education is being given to the public about the different zones and the need for self-policing. This has so far proved successful because there are few violations of the zoning restrictions.

Some of the problems being faced by the GBR according to Hinrichsen (1990) are as follows:
• Initial opposition by fishermen to all restrictions as they wanted the whole reef for trawling. More recently they and their organizations have been co-operating with the plans for the sustainable development of the GBR.
• Problem of natural predators - crown of thorns starfish, with a taste for the coral polyps which build reefs. Much is being done to address this problem but no success is yet recorded.
• Problems of run-off of sediments and nutrients from the mainland into reef waters.

Despite all these problems this program is regarded as successful. Of most interest is the multi-use management concept for the GBR which seems to be a promising way to preserve coastal resources from over-exploitation without declaring the entire area off-limits to use.

The management tactics for this enormous marine area can be applied to other places that are not necessarily barrier reefs. Through the use of zoning, conflicting activities are separated, areas are provided that are suitable for particular activities, and some areas are protected from use. Levels of protection of zones within the park vary from almost complete absence of restriction on activity to nearly complete protection,
where almost no human activities are permitted. In general, uses are held at levels that
do not jeopardize the ecosystem or its major elements.

4.6.0 EAST ASIA: INDONESIA

East Asia (Indonesia) is a region that has much in common with Nigeria. Indonesia
has a tropical climate, produces oil and is a developing country just like Nigeria. Oil
exploration, production and transport are both critical economic activities for
Indonesia but a threat to the nation’s coastal marine environment, a similar dilemma in
that Nigeria finds herself.

Most of the cities and villages within Indonesia as in Nigeria are dependent upon the
coastal environment for their livelihood: for fishing, forestry, building materials,
agriculture and tourism. They share an unfortunate situation that the very resources
they depend on for survival are being needlessly over-exploited and destroyed.

As is also the case in Nigeria, mangrove forests in Indonesia are cut down to make
room for urban expansion, brackishwater fish and shrimp ponds, rice paddies and
coconut plantations. Don Hinrichsen (1990) further clarified the state of Indonesian
environment by stating:

“Coral reefs are smothered by siltation brought in by coastal dredging, mining
development and deforestation. Offshore reefs are blasted apart by dynamite
fishermen, heedless of the destruction they inflict on coral communities. Wastes
from industries and municipalities are simply dumped into the sea untreated.
Rivers bring in more pollutants: sewage, pesticide residues and industrial
effluents.” (p 10-11).
It is a country with fast growing population of a rate of 3million/year and is highly indebted. As their debts increase more resources must be exploited to pay the interest on loans, a type of dilemma Nigeria also faces despite the wealth from oil. Most of the population in Indonesia lives within 50 km of the sea; depending on the sea for food, livelihood and transport (Hinrichsen 1990 p 104).

In spite of all these shortcomings, Indonesia has put together some good plans for the management of their marine environment. Their need for an integrated management has been clarified by the Ministers of State for Population and Environment thus:

“Our challenge is to find ways to incorporate environmental considerations into development plans. We must find ways to translate this message into language that planners and economists can understand”.

4.6.1 SUSTAINABLE UTILIZATION ON THE COASTAL ENVIRONMENT AND ITS RESOURCES

The Government of Indonesia has noted the need to keep an eye on the country’s population growth rates which they realized must be balanced with its dwindling resources. It is a country very much confronted with huge and various problems with regard to resource degradation as a result of over-exploitation and inadequate technics of exploitation, (Koesoebiono and Rochim, 1992) which is also the case in Nigeria.

In efforts to make development sustainable, a sustainable development strategy was introduced into the national development planning process addressing the next five years. One of the main features of this plan is its attempt to manage coastal resources. Problems facing the marine environment that are similar to the Nigerian situation include coastal pollution as a result of inadequate or lack of sewage treatment plants
that leave the river systems polluted with organic waste, sewage, plastics and general refuse. This affects the fisheries in several ways.

Most of the bays, like Jakarta Bay, are so polluted that any of the fish caught are not fit for consumption. This has made the fishing villages turn to having shrimp and fish ponds, a decision that led to decimation of the mangroves for fish ponds. This we know can touch off a chain reaction of coastal degradation. As explained by the Director of the UNDP/UNESCO Regional mangrove project:

"The most senseless exploitation is the clear felling of mangrove areas to build shrimp ponds that still rely on the recruitment of larvae from the reproductive stock at sea for seasonal restocking. Likewise, shrimp ponds built on clear-felled mangrove land cease to be economically viable enterprises after a couple of years because natural recruitment of larvae is no longer possible. New mangrove areas are cleared to set up new shrimp ponds and further destruction follows. Thus, a downward spiral of degradation from a more to a less productive system takes place."

The continued degradation of coastal resources is aggravated and sometimes precipitated by what happens inland. These problems call for a regional/national management of fisheries and other resources and, a strong need for conservation and for the East Asian Seas Action Plan.

At a national level, Indonesia, has put in place certain plans to enhance sustainable development in and around its ocean environment. Historically, the coastal zone and its resources played a major role for Indonesian life and development. Early settlers used it as landing areas for shipping, access to rivers along which people and products could extend inland from the coast. It has served as a major source of food, while more recently its oil and gas and other minerals have been tapped to support
economic development of the country. In addition to this, it has provided for water-borne transport, port development, waste reception from land-based activities, tourism, fisheries and aquaculture, forestry and agriculture. It has been estimated that 60% of the population currently live in the coastal areas (Koesoebiono, et al 1982).

These various activities have side effects on the quality and productivity of many coastal ecosystems, gradually, increasing the threat to their well-being by incompatible development activities either within the coastal zone or from adjacent open sea and upland areas. Cases vary from increasing pollution of coastal waters (specifically in coastal cities) to massive fish kill in Jakarta Bay and Boateng. Overfishing exist on the north coast of Java and the Strait of Malacca. Habitats critical to the fisheries (e.g., mangrove and coral reefs) are also degraded by other sectoral uses.

Based upon available information concerning the existing management and development of coastal resources, and a rational approach of coastal resource management, Koesoebiono and Dahuri (1990) provided an appropriate strategy for developing and managing Indonesia’s coastal resources on a sustainable basis.

The resource potential of Indonesia is very great as she has the second longest coastline in the world after Canada with an estimated length of about 81000 km (Borgese and Ginsburg 1982).

Economically, development activities in the coastal zone are already significant. Approximately 40% of oil and tin is produced offshore (fig.4.9/4.10) and marine fisheries provide much of the animal proteins consumed in Indonesia; coastal areas in the lower reaches of the large watersheds, such as Mahakam and Brantas, contain some of the most fertile agricultural and aquacultural land; and coastal tourism is an important growing source of foreign earnings, (Hinrichsen 1990).
The economic significance of each major development activity is presented in table 4.1. As shown in the table, the total monetary value generated by coastal development activities is estimated at Rp 36.6 trillion (USD $ 22.3 billion), (Koesoebiono and Dahuri 1990). This is then estimated to be 22% of the Gross Domestic Product of the Country.

These coastal activities represent a crucial source of economic and social welfare, supporting either directly or indirectly roughly 60% of the population which presently lives in the coastal areas. The growth rate of these activities in terms of economic significance, is at least twice that of traditional land-based development activities (Canada/Indonesia MTPSP; 1987).

The current economic development is fraught with problems which must be addressed properly to ensure better opportunities for developing coastal resources in the future. Three major issues of coastal resource management have been identified. These are:
1. ecosystem stress and resource degradation
2. resource use conflicts, and
3. threats to sovereignty and resource ownership.

Stresses upon and degradation of coastal ecosystems has resulted from overexploitation of certain resources, pollution and sedimentation or drastic conversion of coastal habitats. While pollution and sedimentation can be stemming from activities either within the coastal zone or from adjacent ocean and upland area, the other two phenomena are confined within the coastal zone.

In recognizing the importance of coastal environment and its resources on the country's sustainable economic development, the Government of Indonesia has undertaken several initiatives to manage, develop and utilize these resources. These initiatives include the following:
1. The creation of a Ministry of Development Supervision and Living Environment (PPLH) in 1978. This was to strengthen that harmonization between development and environmental considerations. This is presently known as the Ministry of State for Population and Environment (KLH).

Table 4.1: Monetary value of Development Activities within Indonesian Coastal Zone in 1987.

<table>
<thead>
<tr>
<th>Activities</th>
<th>Value in trillion rupiah</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil and gas</td>
<td>11.777</td>
</tr>
<tr>
<td>Industry</td>
<td>7.588</td>
</tr>
<tr>
<td>Transportation and Communication</td>
<td>5.528</td>
</tr>
<tr>
<td>Shipping and ports</td>
<td>4.905</td>
</tr>
<tr>
<td>Agriculture</td>
<td>3.674</td>
</tr>
<tr>
<td>Fisheries</td>
<td>1.589</td>
</tr>
<tr>
<td>Tourism</td>
<td>0.694</td>
</tr>
<tr>
<td>Forestry</td>
<td>0.295</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>0.274</td>
</tr>
<tr>
<td>Coastal community Activities</td>
<td>0.128</td>
</tr>
<tr>
<td>Mining</td>
<td>0.116</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>36.568</strong></td>
</tr>
</tbody>
</table>

Source: Canada/Indonesia Medium Term Planning Support Project 1987

2. The enactment of the Environmental Management Act Number 4/1982 concerning the basic provision of environment and natural resource management;

3. The introduction of environmental impact analysis requirements for any project that is assumed to have significant environmental impacts, under Government Regulation No 29/1986, Koeseobiono (1992).

4. The establishment of environmental studies centers within state universities in all 27 provinces of Indonesia.
The importance attached to the development of marine affairs and law of the sea is evidenced by the action plan for sustainable development of marine and coastal Resources prepared by the Indonesian National Development Plan Board (BAPPENAS) and which include the medium-term (five years) policies and programs to complement the Industrial Development Plan (REPELITA) for the period 1989 - 1994, Sugandhy (1992).

The proposed Spatial Planning Act, which will ensure that all development activities are placed in suitable locations, (Koesoebiono 1992).

To curb the problems facing the Indonesian management systems, Koesoebiono and Dahuri (1990) have suggested an appropriate approach based on the principles of sustainable development.

Koesoebiono suggests serious implementation of proper spatial planning to integrate both conventional land-use and sea-use planning. For renewable resources like the mangrove wood, fish and crustaceans, Declarke (1985) suggests that such resources should not be harvested more than a certain amount which can either be produced or renewed over the same period.

For pollution, Krom, (1986) has the view that it can only occur if the amount of wastes discharged into the coastal environment is greater than its environmental assimilative capacity. Environmental assimilative capacity means the ability of the coastal environment to absorb a given flux of pollutants before there is an unacceptable environmental hazard. Every waste discharge must therefore meet the criteria set up by effluent or ambient standards based upon the environmental capacity of the coastal environment.
Koesoebiono and Dahuri (1990) are of the view that the concept of sustainable development can only be made operational if the functional capacity of coastal ecosystems to sustain development activities is recognized. In addition to this they suggested that the future demands for development activities in the marine environment be predicted so as to define the proper planning, program and development of this area. Prediction is an important aspect of strategic planning. The rate of development activities must not surpass the carrying capacity of coastal ecosystems. This will of course require that the carrying capacity analysis be carried out for any proposed planning and development.

Finally, Koesoebiono calls for a single agency or an interdepartmental (intersectoral) agency that will be the coordinator and mediator for all involved sectors in marine development and management from the planning up to implementation stage.

The success of this will depend very much on the
- availability of data and information,
- competent and committed staff,
- an adequate budget, and
- a sufficient authority and political support.
CHAPTER FIVE

5.0.0 INTEGRATED MANAGEMENT AS A BASIS FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

"The condition of the environment is extremely serious. In spite of improvements in certain areas, the situation as a whole is continuing to deteriorate. It would be irresponsible to delay drastic measures any longer. Radical decisions, which will affect everyone, are unavoidable. Not only the improvement of environmental quality, but also the very survival of mankind is at issue. Unless we set a different course quickly and resolutely, we are heading for an environmental catastrophe. The only way to avoid it is to lay a basis now for sustainable development."

Linda Starke (1990 p 40).

These are the words of Linda Starke describing the present state of the world generally and the urgent need to define a basis for sustainable development. So far we have seen how the Nigerian marine environment has been managed, and the haphazard manner in which management is carried out. The basic requirement of a coastal state to achieve sustainable development has been discussed at length in chapter 3.

This chapter seeks to discuss more on what integrated management means, the stages involved and the goals for which Nigeria should strive to achieve sustainable development.

The Atlantic Ocean has helped to provide a means of transport, trading, communications and subsistence fishing for many generations in Nigeria. Though these have contributed economic development and social transformations, they have
been done at the expense of the environment and national security. Such development has been unsustainable.

Environment and development are two-inseparable entities and are intricately linked. This linkage requires that ocean and ocean management strategies be geared at the same time to produce food, serve as a medium and a terminus for transportation, support industries, support tourism and generally provide for human settlements. Strategies must also aim at maintaining the marine environment as a resource of suitable quality to support adequately the needs of future generations. Hence, the solution can be found only by a common pursuit of sustainable development noting the linkages among the development sectors which require proper improved decision making regulatory processes to support integrated management.

Sustainable development has been defined in several ways. According to FAO,

"it is the management and conservation of the natural resources base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations."

Such development conserves the land, water, all natural resources and plants as well as genetic resources. It is environmentally non-degrading, technologically appropriate, economically viable and socially acceptable.

Others have defined it as a type of development that maintains a particular level of income by conserving the sources of that income, the stock produced and national capital.
The essence of all definitions is that:

"it is a pattern of social and structural economic and other societal benefits available in the present without jeopardizing the likely potential for similar benefits in the future" (Gro Harlem Brundtland 1987 p xi).

According to Brundtland, sustainable development requires meeting the basic needs of all and extending to all, the opportunity to fulfil their aspirations for a better life taking into consideration that certain limitations have been imposed by the ability of the biosphere to absorb the effects of human activities. The solution to this problem lies in proper management.

What then constitutes proper management?
Proper management it seems must be that aimed at achieving sustainable development and:

- preventing harm from all anthropogenic activities,
- taking into consideration a holistic approach so that all attempts to prevent harm will not result in a transfer of such harm directly to other sectors of the environment,
- encouraging cooperation at a national level among all actors in the marine area in order to achieve all objectives for the preservation and protection of the marine environment.

A move towards sustainable development through integrated management requires
1. a sound understanding of the different phenomenon taking place in the marine environment,
2. active participation between actors intervening in the various sectors,
3. close coordination at the decision-making level,
4. cooperation at the implementation level, and
5. allowing for social and economic development while protecting the long-term viability of renewable resources, e.g. by preventing over-exploitation or destruction.

Indeed, the concept of sustainable development reflects the aspiration that the total value of renewable resources should be passed on, intact or enhanced, to succeeding generations.

In addressing the students of WMU, (1994) Mann Borgese, affirmed that the basis for sustainable development is integrated management as.

Management as it relates to integration is a dynamic process that addresses the daily operations needed to satisfy the objectives of a plan. The major actors here are the managers and users. Success of management depends on the marriage of these two, the managers and the users. The users of the resources are the most important component and the base of integrated planning and management. This is because, it is the contribution, commitment and good will of users that will lead to the success of any management strategy.

Management, in general terms, according to Henri Fayol is defined as follows: ”to forecast and plan, to organize, to command, to coordinate and to control”. According to Peet G. (1994), it is the actual control exerted over people, activities and resources. He further states that it is an act of transferring policy decisions into practice. A more concise definition of management in relation to integrated use of the marine environment is that by R. Bilder, (1993). He says that “management is an attempt to provide order for a directed balance between and among the various uses of ocean space, as well as to protecting the ocean environmental viability”.

The definitions by Fayol and Peet have however brought to light two-additional terms, policy and planning. These terms have been discussed in previous chapters as prerequisites for integrated management in achieving sustainable development.

Therefore for integrated management to be possible and practicable there is need for integrated policies and an integrated planning practices. These three issues, integrated management, integrated planning and integrated policy are very much dependent of one another as represented with the triangle above.

The issue of integrated management for sea areas under national jurisdiction is therefore incomplete without mentioning planning and the policies involved. Both of these require a thorough knowledge of the current state of the environment for Nigeria to develop and implement a workable integrated management strategy for the sea areas. There is therefore an obvious need for an integrated approach to the planning and management to ensure sustainable development.

5.1.0 PLANNING: Integrated Planning for Nigeria

Simply defined by Peet G. (1995) as the elaboration of a strategy for action to be carried out over some defined period of time, it is an activity that provides the framework for decision-making on how ocean resources are to be allocated. A more
comprehensive definition has been given by Scott in (1963) and J. Walker (1830) as follows:

"Planning — the development of alternative courses of action to achieve such objectives and the selection of a course (or courses) of action from among those alternatives" Brian Scott (1963). "— so that the improvements be such as may be carried into effect by degrees --- at the same time a part of a great and connected whole." J. Walker (1830).

Both definitions show that it is a way of deciding what to do and how to do it by laying down in prioritized manner the strategies needed.

There are various plan types but the elements of an individual plan of any type are similar only with different emphasis on the various elements. Peet, (1995) identifies elements of a ‘traditional’ generic plan as follows:

- Problem definition
- Problem analysis
- Definition of objectives
- Preparation of alternatives
- Choice between alternatives
- Formulation of plan
- Implementation of plan
- Contingency arrangements

Defining the problem will entail addressing the present state of the environment with regard to the development and management. Much of the problem definition relating to Nigeria has been done in chapter 1. Analysis is then carried out to know what issue is most pressing before defining the objectives which should be based on the most pressing issues. Alternatives are then formulated and put to work and backed up with contingency arrangements should we experience failure along the chain of objectives of the plan.
Miles 1989 further states that we should not however forget in a plan, what we want in general terms and within given circumstances i.e. biogeophysical condition. Miles has also realized that cost is a major element in the evaluation of and choice between alternatives. Uncertainties, he says must not be forgotten in any plan, contingencies of a foreseeable kind should therefore be in place. It is a firm basis for proceeding if present circumstances might be overturned by subsequent events.

Subsequent events may not be the only cause for the failure of plans, poor implementation is also another cause. Faludi, (1976) noted that in practice the implementation of programs is a sore point with planners. This is a major weakness in Nigeria. Certainties and uncertainties can best be taken care of by strategic planning.

Peet (1995) has also clarified that the nature of a plan is determined by the emphasis given to specific elements of the plan. With reference to action and management plans the emphasis should be on implementation, while contingency plans would concentrate on the possibility that practice is not in accordance with what has been planned, and policy plans would be focused primarily on defining objectives.

Whatever the case is, we must realize that the specific characteristics of sea areas require the development of specialized plan types and elements of plans. In particular, methods tools and instruments of the developments and preparation of plans and subsequent management of the seas under the Nigerian jurisdiction must be done in an integrated manner assisted by these specialized plans. Methods of getting information for instance, could involve mapping and other data systems (e.g. atlases, geographic information systems, GIS, etc.). The GIS is an integrated environmental database and is very essential for translating a variety of data into useful information for decision makers. Danny, (1993) has however designed a flow diagram (fig 5.1) shown below to illustrate an approach to formulation of an integrated ocean resource use and
Figure 5.1  Simplified representation of objectives, components and pathways necessary for the development of integrated Ocean Development Plans.

[Diagram showing the flow of objectives, sustainability, and options towards a plan]

System components: Resources  Subsystems  Compatibility
- Living - Non-living - Space
- Environmental Services
  - Climate control - Coastal protection
  - Atmosphere - Water cycle - Mineral cycle
- Users
  - Food - Transport - Waste
  - Recreation - Energy generation
- Environmental Effects (costs)
  - Resource loss - Degradation
  - Aesthetics loss - Opportunity loss
- Socio-economic conditions
  - Political - Economic - Social
- Management
  - Legal - Institutional - Capacity

Ocean Development Plan
development plan. It is a simplified representation of objectives, components and pathways necessary for the development of integrated Ocean Development Plans.

Within each management area, whether sub-national, national, or regional, development objectives need to be set, opportunities identified and evaluated within a framework of sustainable present and future use. (Danny, 1993 p 63).

For definition of objectives and the generation of alternatives usually there is a need for:

- brainstorming
- decision trees and
- AIDA (Analysis of Interconnected Decision - or Design - Areas) Frend and Hickling (1987).

5.2.0 POLICY: Integrated Marine Policy for Nigeria

Policy is a set of guiding principles or procedures designed to influence the actions and decisions of individuals or groups, J.P. Levy (1988 p 327). Miles defined it as a purposive course for action followed by governmental actions in response to some set of perceived problems.

Like any other ocean area in the world, all activities within the Nigerian waters are all linked and directed to the same goal, development. An effective policy will create new opportunities and ensure responsible management both now and in the future even though a major difficulty lies in the ways and means to establish such a policy. Some of the problems could be that of various national criticisms even in an exhaustive, comprehensive marine policy, J. P. Levy (1988 p 327).
Requirements for Integrated Policy

An integrated policy should state clearly what is or is not permissible; that is setting out priorities. In fact, policy formulation includes the determination of priorities. It should involve long term planning and prevention especially concerning the environment, Underdal, (1980 p 161).

Any policy has to be judged in the context of the priorities given by a state to its various objectives. Such objectives should ensure governmental planning in order to make best use of the ocean space and its resources. Ideally, knowledge of all the ocean environment, existing and potential uses, are very necessary. The state should take into account short and long term economic, political and diplomatic objectives and the interaction of the various marine activities. Finally, the establishment of a national integrated policy calls for the following: (i) a mechanism for collecting and transmitting information, (ii) a planning body for integrating this information, and (iii) a decision-making body to take policy decisions.

Policy decisions have to be translated into practical application through appropriate legislation and implementation mechanisms, (J.P. Levy 1988 p 328). Such appropriate implementation mechanisms can then translate all set priorities into specific projects which must not be in conflict with one another. It then calls for good implementation through an appropriate institutional framework. This will be discussed further in chapter 6.

A perfectly integrated policy can therefore be defined as one where all significant consequences of policy decisions are recognized as decision premises, where policy options are evaluated on the basis of their effects on some aggregate measure of utility, and where the different policy elements are consistent with each other (Underdal 1980 p 160). In Nigeria the need for a significant benefit, in economic
terms, should address all economic activities such as offshore and industry, shipping, fisheries, extraction of sand and gravel and generation of power among others.
Policy for offshore industry should state categorically the importance of prevention of environmental pollution before granting licenses. There should be safe and efficient maritime traffic along the Nigerian coast as well as in and out of Nigerian ports. Fisheries should aim at preservation of profitable fishing industries, providing maximum employment, and preservation of fish stocks for future fishing activities.

Sand and gravel extraction, has been done to meet urbanization demands i.e. land reclamation for construction and dredging of the approach routes to ports. All of these have negative impacts on the marine environment and its resources. Thorough investigation must be carried out to examine consequences of these activities.

There should also be policy for the use of space which should aim at the harmonious attunement of all user functions. All rules should be integrated and possibly harmonized with all ecological values such as the mangroves, fisheries and with particular regard to other activities such as shipping and drilling operations. In addition, there is a need for designation of special zones along the coast for recreation. This would include water sports, boat sailing and surfing and also recreational fishing.

Environmental policy calls for a lasting preservation of the ecological value of the Nigerian marine environment. Serious consideration must be given to environmental effects before any new activities are undertaken. Key areas of interest should be:
- the conservation or restoration of the widest possible variety of aquatic ecosystems.
- the prevention of irreversible harmful changes as a result of human action even in the face of uncertainty. In the face of uncertainty the precautionary principle would best apply. It is taking
"preventive measures when there are reasonable grounds for concern that substances or energy introduced, directly or indirectly, into the marine environment may bring about hazards to human health, harm living resources and marine ecosystems, damage amenities or interfere with other legitimate uses of the sea, even when there is no conclusive evidence of a causal relationship between the inputs and the effects" (Copenhagen declaration 1994 p 2).

The precautionary principle embraces no deterioration of the present quality of the environment and reduction of the overall scope of environmental pollution.

Practically, the prevention and combating of marine pollution should preferably take place at the source of the pollution, e.g. by modification of the production processes. Polluters must bear the costs incurred by their pollution. In case of accidents, fast and goal-directed actions must be taken to limit and prevent pollution on the ocean area as well as on shore.

An integrated Policy can have long-term effects and help to achieve a more equitable distribution of costs and benefits.

5.3.0 INTEGRATED OCEAN MANAGEMENT OF THE NIGERIAN MARINE ENVIRONMENT.

Integrated Ocean Management involves management of a nation’s marine environment as defined in chapter 1. Many writers on the ocean and its management such as Miles, S.M.A Vallejo, Couper, Levy, Underdal to mention just a few have noted the linkage between the coast and the ocean and for that reason, a lot of activities taking place in the coast also affect the ocean environment (fig 5.2).

Levy (1993) has noted that inspite of this linkage, there is difference in the management terms used in these two areas. He states that the management used
depends on spatial dimension covered by any formulated policy. According to him, ocean management or sea use planning are used when the planning area is extended to a wider area that may include the EEZ of a country as covered by the present study. The coastal zone encompasses a limited land-sea area under national jurisdiction and sometimes extends to the limits of the territorial sea.

Fig 5.2: Relationship between coastal zone and coastal resource systems, (Scura et al).

In trying to locate the most profitable direction for integrated management, it is necessary to know (a) why we need it, (b) who should be responsible for it, and (c) what exactly needs to be managed.

1.) Why does Nigeria need integrated management for sustainable development of its marine environment?

(a.) It is one of the strategies proposed by the World Commission on Environment and Development as a means of achieving sustainable development. It meets the need to resolve problems in sea areas.

(b) There is a continuing need to develop in a sustainable manner, the resources of the Nigerian marine environment.

(c) The 1982 UNCLOS stipulates that governments have a responsibility to manage certain aspects of their sea areas as already explained in chapter 1.
(d) Utilizing the environmental and economic goods and services provided by marine and coastal ecosystems is necessary to meet development objectives.

The reasons for the need for integrated management cannot really be separated from the objectives of integrated management as noted by Peet G. (1994) in his Ph.D. thesis.

It should be taken into consideration that the coast and the marine ecosystems are closely linked. It is impossible, therefore, to draw a dividing line between the marine environment and that of the adjoining coasts and estuaries. There is transboundary movement between the coast and the sea and across international boundaries of all human impacts. Most of what goes on in the sea respects no administrative or legal boundaries in terms of the impact of human activities. This actually brings about the issue of transboundary responsibility mentioned in chapter 3 which requires regional cooperation of affected nations for a definite solution. It is not possible to completely disconnect distinct sea areas from the land and coastal areas adjacent to it. This makes it very important that the ocean management strategy integrate the management and protection of oceans and their coastal waters. It is possible to identify parts of the sea that are, from a physical and/or ecological perspective, 'manageable'. In an attempt to do this, efforts have been on

- Large marine ecosystems (LME)
- River catchment areas
- catchment areas draining directly into the sea

Sherman and Alexander (1986) define LME as extensive areas of ocean space (>200,000km²) characterized by distinct hydrographic regimes, submarines, topography, productivity and trophically dependent populations. From this definition, the Nigerian marine or ocean area covered in this study is a Large Marine Ecosystem.
River catchment areas and catchment areas draining directly into the sea are manageable land areas relevant to the management of sea areas. Concentration is on human use areas as far as this study is concerned. This is because much of human activity is dependent on physical and ecological characteristics of sea areas.

The geographical scope of integrated management for such areas can thus be based on physical and ecological considerations. This is particularly true of fishing activities, oil exploitation/exploration as well as disposal of wastes to mention just a few. One activity which encompasses areas larger than those areas solely under national jurisdiction is shipping. Here, the world’s seas and oceans are solely appropriate level for its management. But the port areas and those traversing national waters traversed by vessels could be areas of interest to a coastal nation such as Nigeria as discussed in chapter 1. This activity should not then be left out of Integrated Management.

2.) Who should be responsible for planning and management systems for sea areas under national jurisdiction? There are already an increasing number of sectors getting involved in sea related activities. These range from NGOs (i.e. groups of individuals such as environmental organizations, scientific research institutions, local individuals), public and private establishments as well as international organizations (regional and global). There has to be a proper balance between the different responsibilities of the various sectors regarding integrated management for sea areas, but focus should be on the role of national governments. This is because:

a) the international law of the sea allocates certain responsibilities to national governments,

b) national governments are generally the only administrative body with responsibilities for large sea areas,

c) national governments can normally provide guidance to ‘lower’ administrative levels in a country (i.e. local, provincial, administrations etc.)
d) national governments normally determine what international organizations will decide and are responsible for the national implementation of international regulations.

3.) What should be managed or planned for by the Nigerian Government?
Two things need to be addressed.
a.) determine the area to be covered
b.) determine the issues to be addressed

The former has been discussed partly in this chapter and more on this has been said in chapter 1. The question of which issue brings us to the areas of the different human uses of the sea area within the Nigerian jurisdiction. Peet made it clear that the issues to be addressed in a system of integrated management (planning and policy) of a sea area should include all activities taking place in that sea area and those activities outside the area that have an effect on it. This as has already been noted will include those catchment areas draining directly into the sea.

The different human functions in Nigeria which need to be integrated in management are:
i.) shipping - the ocean area used for access routes to Nigerian Ports
ii.) Fisheries - the level of fishing effort (such as the TAC.).
   - determining the use of the appropriate tools or equipment such as the net sizes of trawl and types of trawlers
   - determining the fishing areas
iii.) Oil/gas production - areas to be used
iv.) Others - such as hydrography and scientific marine research.
5.3.1 REGULATING SHIPPING

It has been noted that 60% of ship accidents in the world occur in and around ports. Hence the need for efficient management of shipping in the Nigerian waters covering all port access routes in the territorial waters and over the continental shelf.

To manage shipping services in Nigeria, the following needs to be regulated and monitored.

I.) Marking Services:
   a.) marking of shipping lanes, channels and navigation hazards
   b.) provision of lighthouses, light platforms and light vessels for long distance orientation, and for local safe navigation through various sorts of buoys and beacons. There should be adequate provision of servicing ships for this purpose.

II.) Vessel Traffic Services (VTS)
   a.) These should regulate shipping in the approaches to the seaports of Lagos, Warri and Calabar etc. There should be a VTS authority to regulate shipping traffic. All incoming and outgoing vessels should report to the respective VTS centers for information and advice. Every major port area should have a VTS center and reports should go to an overall VTS authority in any of the major ports.

Part of the services should include deciding upon the admission of ships to the port area, especially for large vessels and vessels carrying dangerous cargoes. Another part of the VTS should be to enforce regulations and to supervise work being carried out in the waterway through use of patrol boats.

5.3.2 COAST GUARD

An organization of this type in Nigeria is needed to perform vital tasks as follows:
I.) Service tasks
   a.) distress, urgency and safety traffic information (by radio)
   b.) search and rescue
   c.) combat pollution of the environment and disasters such as accidents
   d.) VTS and aids to navigation

II.) Surveillance Tasks on daily basis,
   a.) general police tasks such as law and regulatory enforcement
   b.) surveillance of the environment
   c.) surveillance of fishing activities
   d.) surveillance of maritime traffic
   e.) guarding of boundaries for security and against dispute

The Coast Guard should also be in charge of the co-ordination of all operations and special actions. The Coast Guard Center should be manned day and night and should be contacted directly from shore and from sea. Their operation should cover the whole area of jurisdiction of the Nigerian waters. They should be well provided with patrol vessels and vessels for marking services, oil combating vessel, coast guard airplane.

III.) Pilotage of sea going vessels
Radio Navigation Systems. These exist but lacking maintenance. There is need to ensure proper functioning and maintenance of these. A private organization can take on this very important area for a proper functioning and maintenance as is the case in the Netherlands where public radio communication with ships and marine platforms is maintained through Scheveningen Radio (PCH) and operated by PTT Telecom. This radio station sends and receives telegrams, telephone calls and telex messages 24 hours a day. The private organization can make their charges through the port authority by including the cost of their operations as part of surcharges to port users i.e. shipowners and charterers
5.3.3 FISHERIES

- There should be thorough supervision of fisheries. Such supervision should cover the following:
- enforcement of catch quotas (i.e. allowable catches) by means of random checks.
- inspection of fishing equipment, mesh sizes of deep sea net; catches of undersized fish and the 'subsidiary catch'.
- prevention of fishing in prohibited waters to be identified by the relevant institution responsible for fisheries. This may General Inspections Department in the Ministry of Agriculture and Fisheries in collaboration with Marine Inspection Division in the Ministry of Transport.
- administration of licenses and other document to be carried on board.

5.3.4 OFFSHORE OIL/ GAS OPERATIONS

There should be a thorough supervision of oil/gas operations by a department of the Ministry of Mines and Power. This supervision might as well be concerned with the enforcement of provisions of the mining Act and regulations. This must be with particular regards to such matters as environmental hazards and industrial safety and proper disposal of offshore drilling structures. This will require the use of ships and helicopters of the Coast Guard, Navy or airforce.

Cases of disaster in offshore oil/gas exploration and exploitation have resulted in the adoption of international conventions, standards, recommendations and guidelines aimed to prevent marine pollution and to improve maritime port safety where transportation is involved. Some of these conventions are MARPOL, SOLAS offshore installation etc. Our ministries and in particular the department of such ministry responsible for offshore oil/gas production should be aware of the
requirements of such conventions, ensure that the country is signatory to them in order to implement all necessary provisions in them.

5.3.5 MANAGEMENT OF OTHER AREAS

These areas include:
- hydrography
- research and
- recreational activities

(i) Hydrography

The Nigerian hydrographic services should be fully involved in creating new up to date charts for research works in the research institutes. Both hydrographic charts and charts for fishery should be published for use by all concerned. Hydrographers should also be in position to issue notices containing up to date hydrographic and nautical information to mariners on a regular basis.

Appropriate vessels for mapping/research should be provided, used and maintained. In some places in the world e.g. the Netherlands such vessels are provided by the coast guard or the navy who have at their disposal several patrol vessels for their different operations.

(ii) Research

Research is usually carried out in the areas of fisheries and the sciences generally.

A). Fisheries Research

Information about fish stocks is of direct importance to the fishing industries and for any agreements on annual catch quotas (i.e. the maximum quantities of fish per species which may be landed by the various licensed fishing industries without danger of overfishing. Technical research should also be carried out on fishing equipment and
energy consumption, and fishing areas. Such areas should be identified, demarcated and protected. The ideal vessel should also be provided for such functions.

B. Scientific Marine Research

This is an area that should focus on support of policy and management. This is already an area of specialization of the Nigerian Institute of Oceanography and Marine Research (NIOMR). NIOMR, presently is concerned with marine research but deals mainly with physics, chemistry, oceanography and marine biology. The research from the institute should be directed more towards fundamental knowledge that could be useful in solving new problems later.

The institute needs to collaborate with the Federal Environmental Protection Agency, (FEPA), all ministries concerned with oil/gas, mining etc. as well as all other organizations concerned with any ocean related activities. Research by other non-governmental organizations should be policy related.

Research from NIOMR, which is very much into fisheries should be related to the development and conservation of fish stocks. However, more has to be done on fisheries research in the areas of impact of environmental pollution.

Information about fish stocks is of direct importance to the fishing industries and for international agreements on annual catch quotas. This will help to check overfishing. NIOMR also needs to carry out technical research on fishing equipment. All research programs may also be directed towards fundamental knowledge, i.e. ‘background research’ which is not intended for application but could be used in solving new problems later.

All research programs must be interdisciplinary and demand the interaction of scientists with different training and experience. The social, economic, and political
dimension of resource use also needs to be studied and incorporated into decision making.

For a sound environmental policy, there is need to know the influence of pollution on fisheries and what must be done to maintain a healthy environment. NIOMR can cooperate with other weather research institutes for exchange and coordination of informations on weather.

(iii). Recreational Activities.
Presently, tourism and recreation as resources are so neglected that one can reliably say that the government is not realizing any financial benefit from these activities. Nigeria has great potential for developing her tourist industry. Since the ocean coast plays a major role in tourism and recreation, it then calls for the maintenance of clear water along the whole coast.

Setting up marine parks and conservation areas could help to encourage sport fishing, sailing, boating, seaports and beachside picnics. Developing tourism could generate jobs for thousands of people across the nation and especially along the coastal states. This is because, it is an industry that requires food, materials and services. Most important of all, it would be a good source of foreign exchange for the country which would save even the foreign exchange that would otherwise be spent outside the country.

To make all the suggested activities possible, there is need to appoint an interministerial committee to coordinate all the affairs and activities of the Nigerian ocean waters. NIOMR needs a department that would collate and store all haphazardly collected data relating to the ocean use. Such a department could be called NIOMR Information Services and would strive to transform data into usable information. Such information should be highly computerized and made accessible to
all users such as schools, institutes of higher learning, and other bodies that relate to the sea in their activities.

The Marine Information Services (MARIS) of the Netherlands is a foundation involving the government, science and industries. MARIS offers users direct entry to information and knowledge concerned with the North Sea in the areas of maritime traffic, offshore activities, hydrography, meteorology, physical oceanography, water quality, marine biology, geology and geophysics. Such a department in NIOMR can also offer these services and even much more provided we lay our priorities right.

5.4.0 NATIONAL GOALS FOR INTEGRATED OCEAN MANAGEMENT

According to Bildar' (1993), management encompasses the following steps as listed below:

1. collection of data,
2. organization and analysis of data
3. setting of priorities
4. making choice related policy objectives
5. laws
6. regulations
7. implementations of policies
8. surveillance and enforcement of rules
9. evaluation of results

These cannot really be achieved without first having to set the right goals. As a nation the goals for achieving integrated management should not be too far from what has been identified in the previous sections which include regulating shipping, fisheries, marine research etc. In addition to these the above listed steps have to be taken into
consideration. In Nigeria, the objectives to achieve sustainable development should be as follows:

- to establish a framework and guidelines to manage the oceans' resources, both renewable and non-renewable, on an economically sustainable and environmentally sustainable basis;
- to establish a legal framework to support the implementation of a Nigerian Ocean Area Management (NOAM). This should have a strategic planning staff to carry out long term planning.
- to establish a clearly identifiable leading Federal Agency accountable for ocean management;
- to enhance, focus, coordinate and disseminate Nigeria's scientific, environmental and management information relating to oceans and their resources;
- to assert and enforce Nigeria's sovereign rights and responsibilities over its ocean resources and areas;
- to develop professional resource management and technical monitoring capabilities;
- to improve public participation mechanisms and programs;
- to obtain international co-operation and assistance;
- to improve the information base; and
- to foster the ability to anticipate critical issues and to identify social and environmental carrying capacities.

To achieve all of the above, there is need for a Nigerian Oceans Act (NOA). This legislation would provide a legal framework for the implementation of the Nigerian oceans management strategy. This legislation should focus mainly on the marine area under the national jurisdiction. It must be broad in scope but specific in structure and should establish the national right and responsibility to conserve and protect the ocean environment and the ecosystems and resources they contain. It should also provide the legal authority to coordinate all national ocean-related initiatives.
Under the authority of such legislation, the federal government and all stockholders would jointly develop a planning framework for the development of an integrated management regime for all the marine areas of the nation.

The federal government must be committed to restore, preserve, enhance, monitor and report on the quality of the ocean environment. The quality of the ocean environment should be measured against guidelines, objectives or standards set to maintain habitat quality, resource abundance, quality of such resources and their diversity.

Authority to set and enforce the standards and guidelines required to conserve and protect the integrity of oceans and their resources should be established by the oceans legislation.

In all, a common focus and plan of action is required for the coastal areas because one cannot really draw a dividing line between the marine environment and its adjoining coasts and estuaries. We must not forget that the coastal waters support many of the most productive and biologically diverse ecosystems and should not be left to be governed by multiple political jurisdictions such as the federal, provincial, regional and municipal authorities. The ocean management strategy recommended should integrate the management and protection of the ocean and the coastal waters.

It is hoped that these strategies will facilitate coordination, harmonization and consolidation of ocean-related responsibilities to achieve sustainable development and resolve multiple use conflicts.
CHAPTER 6

6.0.0. CONCLUSIONS AND RECOMMENDATIONS

6.1.0 RECOMMENDATIONS

Sustainable Precautionary action and integrated management are basic principles needed to achieve sustainable development of the Nigerian marine environment in the light of UNCED. Integrated management entails maintaining a balance between protection of valuable ecosystems and development of ocean/coast dependent economies.

There is strong need for full democratization. This means ensuring the widest possible participation in transparent and accountable environmental decision making processes with public participation on environmental issues. There should be access to all data concerning the environment, regular audits of government progress in environmental protection and regular reviews of the state of national implementation of all appropriate international agreements. All private and public companies should be obliged to make full and timely disclosure of all their activities as they relate to the environment.

The three 3-phases of integrated ocean management as proposed by Levy (1988) constitutes establishing an integrated ocean policy; planning which is the adoption of concerted strategy for the implementation of the goals determined within the policy; and the implementation consisting of the organization of measures required to translate into reality the different resources (material, human etc.) for development process.
These three phases depend very much on the creation of appropriate institutional arrangements, a legislation and the ability to mobilize the necessary financial, technical and human resources. Provisions have been made for financial, technical and human resources for implementation of integrated management and sustainable development of nations coastal areas and their EEZ as reported in the decision reached by the main committee of UNCED. These are contained in Agenda 21 chapter 17 A/Conf’/151/L.3/Add.17 (12 June 1992) (appendix 4). It is therefore left for the Coastal nations and Nigeria in particular to tap on these opportunities.

In addition to what has been identified in chapters three and five the author would like to recommend that the national coordination mechanisms in Nigeria should provide:

- prior environmental impact assessment (EIA), systematic observation and follow-up of major projects including the systematic incorporation of results in decision-making.
- Contingency plans for human induced and natural disasters, including likely effects of potential climate change and sea level rise as well as contingency plans for degradation and pollution from anthropogenic origin, including spills of oil and other materials.
- Periodic assessment of the impacts of external factors and phenomena to ensure that the objectives of integrated management and sustainable development of the marine areas are met.
- Human resource development and training and public education, awareness and information programs.
- Promoting environmentally sound technology and sustainable practices.
- Conservation and restoration of altered critical habitats.

Nigeria could improve her capacity to collect, analyze, and assess data on environmental impact of activities affecting her marine areas. This should receive
priority support in view of the intensity and magnitude of the changes occurring in the coastal and marine areas. To this end, it is necessary to

- develop and maintain databases for assessment and management of the marine areas and all their resources
- conduct regular environmental assessment of the state of the environment of the marine areas.
- maintain profiles of the marine areas resources, activities, uses, habitats and protected areas based on the criteria of sustainable development.

6.1.1 THE NEED FOR ENVIRONMENTAL IMPACT ASSESSMENT

Agenda 21 chapter 17 of UNCED has specifically recommended EIA for all projects as noted earlier. This is particularly of relevance to the Nigerian situation. Imevbore and Adegoke (1991) have also indicated that:

"to achieve the goals of any approved policy on the environment to pursue sustainable development, it is vital to establish Environmental Impact Assessment Procedures (EIA) as a way to balance the varied and often conflicting societal interests with safety, quality of the life and environment and conventional technical and economic factors."

Nigeria is a fast growing country with regard to industrialization all in a bid to carry out bold plans that are made to diversify industries as part of the current effort to revive the national economy. Lee Kimball, (1985) has pointed out that the principal variables that influence the magnitude of impacts are:

- the natural resources used as raw materials
- the type of industrial processes involved; and
- the pollution control features built into the project.
The application of EIA procedures would allow Nigeria to examine all these options critically and select those that are environmentally most acceptable and which incorporate:

- low waste generation
- less toxic by-products and effluents
- higher energy efficiency
- higher waste recycling ratio

This calls for a law making it mandatory for EIA procedures to form part of the decision making process for all projects at both the pre- and post implementation stages. This is necessary because experience globally has shown that failure to incorporate EIAs into a project at the outset generally results in higher expenditure later for curative health and environmental programs to control pollution and manage industrial wastes. It is also vital during the planning stages of industrial or other development projects to establish procedures to monitor environmental health impacts of the facilities as they are put into operation.

The EIA should not just end with the issuance of a statement, but should continue while the project is in operation.

Nigeria should implement EIA as outlined in the Copenhagen Declaration 1994 as follows:

1. EIA must be fully integrated into the decision-making process, and conducted within the framework of a single coherent strategic policy on marine environment protection.
2. It must be conducted at the very start of the decision-making process, and before any development has taken place.
3. All conduct of the EIA must be open to public scrutiny and the process itself must ensure broad public participation.
4. EIAs must be conducted according to an internationally agreed and consistent methodology, and be subject to review by an independent regulatory authority.

5. EIA must keep to the principle of Precautionary Action.

These are just a few of the major requirements as stated in the Annex IV of Copenhagen declaration of 1994 and Nigeria could incorporate some of these requirements if not all, into her legal documents for EIA.

6.1.2 MANAGING LAND-BASED SOURCES OF POLLUTION.

The Nigerian marine environment needs to be protected from land-based sources of pollution. Modern environmental treaties such as MARPOL 73/78, the London Dumping Convention (1972), all require states to reduce, control and prevent pollution.

Managing land-based sources of pollution calls for a precautionary approach to the marine environmental protection which also is in support of an EIA. The precautionary principle makes it impossible to carry out an activity unless it can be shown that it will not cause harm to the environment and Nigeria must not wait for clear and convincing proof of possible harm before taking preventive measures.

The report of the Secretary General of the Preparatory Committee for UNCED notes the significance of this point for land-based pollution:

"Given the present uncertainty of the impact of many anthropogenic substances in the marine environment, and the risks they may present to important resources, precautionary approaches are clearly needed in determining the amounts of many substances that should be allowed to enter the oceans and priorities for the implementation of control measures."

These are relevant guidelines that Nigeria could take into consideration for the management of the marine environment. This is particularly necessary because the
Nigerian marine environment is much vulnerable to land-based sources of pollution from her massive network of inland rivers emptying their waters into the ocean.

6.1.3 IMPLEMENTATION

This is the act of transferring policy decisions into practice. The decisions-making process and implementation stage are 2 important periods in integrated management. All decision making processes and implementation procedures need a body or an institutional framework to facilitate the implementation of operational government tasks and decisions concerning the marine environment. For an effective implementation, there should be coordination between the planning and implementation levels with full participation of local government agencies in the planning process. Such a body is also in position to analyse implementation strategies both prior to and after major policy decisions, (Levy 1992).

There has been a maladjustment in Nigeria between the regulatory framework and the requirements of the existing situation as well as the absence of control or insufficient control in the application of the available regulations which are only valid in theory. This problem is due to lack of efficient administrative infrastructure, hence no specific control or supervisory authority for adequate implementation. Nigeria would thus need to establish a coordinating institution at the highest level e.g. interministerial committee to adopt and direct the implementation of the Nigerian national policy.

The establishment of a Coast Guard would bring together various agencies of the Ministry of Transport, Works and Housing, the police, customs, Ministry of Agriculture, FEPA, NIOMR; Navy and the Military. These government bodies could cooperate with regard to equipment, personnel and operational matters to provides services and perform monitoring and inspection tasks. A Nigerian Coast Guard should be well consolidated for greater efficiency and effectiveness.
National institutional arrangements for the Nigerian marine environment should ideally perform the following tasks:

- policy making
- comprehensive planning and management
- establishment of legal and regulatory framework
- implementation of adopted plans
- coordination
- control and evaluation and marine activity
- program and project
- research, advisory and technical services
- financing of projects
- training of personnel

Nigeria needs an implementation process that must take account of the full range of potential development and uses and have all projects and development activities prioritized. Priorities should be translated through the appropriate administrative mechanisms into specific projects that are not in conflict with each other and respond effectively to national needs. Good implementation is an important step in the optimization of marine resources and uses and paves the way for a long-term orderly and effective expansion of marine development activity.

Research and technical services are also an integral part of the development process and as a key function in program development and implementation. Planning bodies should display enough technical competence and research support and should make sure that all scientific and technical activities undertaken correspond to development priorities and contribute to significant advances in the development process hence making their contribution complementary.
Shortage of trained personnel in the administrative, operational, technical and scientific research areas of marine development call for training of all personnel concerned with ocean affairs.

6.1.4 INSTITUTIONAL FRAMEWORK

The need for proper coordination and harmonization of all marine activities required an institutional framework as noted earlier. In establishing an institutional framework, Levy (1988) has indicated that there is no model that can be applicable to all countries but has advised that certain salient configurations should be taken into consideration in relation to the stage of development of the nations marine resources.

Such configuration as proposed by Levy in 1988 is to consist of the establishment of the ‘super agency’ (a federal agency) for the oceans i.e. the ministry of the oceans. This will centralize responsibility for marine activities.

Under this will be the Interministerial Committee. This will further

1. ensure proper coordination among the several ministries having responsibilities in marine affairs

2. ensure a capability to adopt and direct the implementation of a coherent overall national marine policy for the rational management and development of ocean resources.

This committee will need a comprehensive overview of both the ongoing marine activities and of potential marine activities, and of the interactions among them. This then calls for an intersectoral body that would collect, consolidate and synthesize information and data derived from sectoral sources. Such a body could prepare on a regular basis a ‘blue book’ which would constitute a ‘national marine policy profile’ presenting all marine activities conducted in the country as well as development options. This should permit the interministerial committee to establish policy
directives and set priorities which would in turn be used by a central planning board to develop an integrated marine affairs plan.

The ministry concerned should then translate the approved plan into specific programs and projects and to implement them using the necessary legislation. The institutional arrangements proposed by Levy (fig 6.1) consists of:

(1) horizontal and cross-sectoral layers. The interministerial coordinating committee for policy making; a planning organization for providing a comprehensive overview and for plan formulation with the support of the information/data body, and

(2) a vertically organized substructure of sectoral ministries and agencies for program or project formulation and execution.

An early adoption of an integrated approach to the development of marine areas under national jurisdiction, through the adoption of a national marine policy will make it possible for Nigeria to maximize the use of ocean space and marine resources. This will also make it possible to introduce these resources into their long-term development plan and policy.
6.1.5 SUSTAINABLE ACTION PLANS FOR NIGERIA

The main objective of integrated ocean management is to use resources and services provided by the marine environment to meet development objectives without
degrading the quality of the environment or exhausting stocks of living resources. A change in development planning which recognizes the full values of the ocean and marine resources will require new tools which allow proper evaluation of the resources and environmental services the seas provide.

The first step towards an effective management process is to set up a management team comprised of experts of the different sectors that relate to the ocean in their activities. This can be followed by establishing objectives which may be considered to be the same thing as goal identification as already stated above.

The following action plans would be useful to the Nigerian Government.

Action 1: Develop a National Policy for both coastal and the ocean area.

Governments and citizens' groups concerned with conservation, environment, and development should ensure that the conservation and sustainable use of marine ecosystems and resources features more largely in national programs for planning, pollution control, management of protected areas, and development control.

National policies should:

- establish a mechanism to coordinate the planning and allocation of uses of the coastal zone. This is in view of the fact that comprehensive coastal zone planning for management are essential for areas with; (i) dense and increasing populations such as we have within the coastal regions of Nigeria. (ii) areas where conflicts are occurring or foreseen due to pressure on coastal and marine resources. (iii) seas where overexploitation, pollution, or habitat loss (e.g. mangroves) have a major impact on resource (fisheries) production.
- Set out procedures for dealing with shoreline instability, including sea level rise, subsidence, saltwater intrusion, and settling of deltas during extraction of groundwater or hydrocarbons.
• reduce pollution of the sea from land-based sources
• include local and regional management plans supported by quality criteria, assessment, monitoring and research.
• harmonize national marine policies and the laws with UNCLOS
• provide for cooperative action and shared use of the ocean and its resources beyond national jurisdiction.

The best technology should be used to deal with areas that are vulnerable to sea level rise, storm surges, coastal flooding, or erosion etc. and all coastal habitats such as mangroves and other wetlands, coastal barriers and lagoons should be maintained.

Action 2: Use an Ecosystem Approach for Management of Marine Resources.
This considers relationships among resources and their uses and determines the carrying capacity of the ecosystem. This is most useful for fishery management because they are subjected to natural fluctuations and are greatly influenced by environmental factors.

Action 3: Conduct Information Campaigns to Raise the Profile of both Coastal and Marine Issues and include a Strong Marine Component in Environmental Education in all regions within the Country.

Government agencies, citizens, groups and the media should aim for a major increase in awareness of the importance of the sea for all people and of the mounting threats to the coastal zone in particular. They should promote understanding of (i) the vulnerability of coastal ecosystems and resources to the impacts of inland actions, including actions far upstream (ii) the risks to public health due to contamination of coastal waters and seafood (iii) the need for laws on
pollution prevention, sustainable resource management, and protection of coastal and marine ecosystems and resources

Effective campaigns and formal education needed quantify information, including providing maps, data on marine resources and uses, and on habitat losses and other indicators of coastal degradation. Laws and international conventions should be translated into the language understood by everybody for easy application.

**Action 4: Promote Marine Protected Areas**

This calls for the establishment and effective management of a marine protected area. This can be done by (i) developing guidelines for designating areas (ii) preparing management plans for all such protected areas, where possible integrating them as part of a comprehensive planning mechanism for all uses of coastal ecosystems (as pioneered by the Great Barrier Reef Marine Park Authority in Australia).

Marine protected areas would serve as replenishment areas for marine resources and should be designed to maintain the genetic diversity of key species.

**Action 5: Place high Priority on Preventing Marine Pollution from Land-Based Sources.**

These are direct and indirect introduction of substances by man. Such substances in most cases are harmful to living resources and ecological systems; they impair water quality, reduce amenities and hinder fishing and other uses of the marine environment. The “precautionary”, “polluter pays” and “user pays” principles should be applied to the prevention of marine pollution. Technology to reduce or eliminate pollution at its source should continue to be improved; regulations to achieve this should be enforced and relevant economic instruments strengthened. Existing pollution should be reduced as quickly as possible.
Action 6: Strategic Planning: One of the suggestions and model put forward for achieving sustainable development of the marine environment has been strategic planning. Strategic planning is a powerful tool that can lead government administration into a process that keeps daily activities in tune with long term national and global objectives. Sustainable development of the marine environment fits well within a category of objectives that can only be achieved over the long term and through cooperative national commitment, Sampson (1995). Strategic planning has much to offer agencies whose aims and objectives is to attain sustainable development of their marine environment. A proposed strategic planning structure has been given for Nigeria in fig 6.2.

Strategic planning is a way of creating strategic vision for any organization. Such vision is usually based on certainties or uncertainties judging from past events and likely future events. It involves gazing at the future and making long or short term plans depending on the circumstances to overcome any future eventualities.
6.2.0 SUMMARY AND CONCLUSIONS

There is a general decline in the health of the Nigerian Marine Environment because present human interference is excessive. The health and integrity of the marine environment can only be preserved if human pressure on it is reduced and natural processes allowed to re-establish themselves.

The Nigerian environmental policies have not really addressed the problems facing the oceans to date even though it is fully aware of such problems. A lot has been done by the countries selected for case studies. Case studies have been made of both developing and a developing country. The countries have economies very much similar to Nigeria and if these were able to develop their ocean management plans and policies in compliance with UNCED’s requirements; Nigeria is in position to develop appropriate integrated management plans, policies and legislations for her ocean environment if the government decides to do just that.

Nigeria must set priorities for uses, minimize use impact on the environment, improve implementation by mobilizing the necessary financial, technical and human resources with the help of appropriate institutional arrangements. In addition it must mitigate and restore the environment where necessary, and seek the most appropriate citing of facilities. This is in accordance with UNCED’s requirement for the achievement of integrated management.

The application of an integrated approach to planning and management has emerged conceptually as having 2-distinct geographical components:

- the coastal area
- the ocean area
Several coastal states have designed and implemented projects and programs either for coastal areas or for ocean areas separately. The increasing population around the coastal areas has led to increased uses of the coast and consequently increases the pressure applied to the coastline world wide. There have been conflicts between users in areas of tourism, fisheries, construction, coastal navigation, military uses etc. The need to reconcile all of these with the basic need to safeguard the environment and ensure the sustainability of the resource base have brought about numerous management approaches to tackle coastal problems.

But the concept of integrated management has been extended to a wider area of ocean space (i.e. the EEZ) thus making sea use planning/ocean management to become a subject of national and regional approaches. Levy (1993) is of the view that coastal area management focuses on the maintenance of the functional integrity of complex coastal resource ecosystems (resource systems). Resource systems being a term used to define coastal ecosystems and the use which man makes of the system to obtain the benefits of the goods and services offered and their development for sustainable multiple use, Burbridge (1989). Geographically it encompasses a special area where the land and sea meet, characterized by its own dynamic and frequently changing features and valuable ecosystems of great productivity and biodiversity, Knecht 1992).

On the contrary, ocean management (integrated) involves a much wider area (as indicated in chapters 1 and 5) than the limited band of water and land defined as the coastal area. It is a methodology through which sectoral activities (navigation, fishing, mining etc.) and their uses, and the environment quality in a sea area are considered as a whole and harmonized. This is to maximize net benefits to a nation but without prejudicing local socio-economic interests and without jeopardizing benefits for future generations, Couper (1992).
Coastal and sea use ocean management areas fall within national sovereignty and/or jurisdiction, integration and planning are therefore within the extent of state control. This requires integrated ocean policy which is global in scope and intent, formulated at the highest national decision making level, and not ignoring fundamental issues relating to the management of the ocean area under national jurisdiction. A national ocean policy therefore must include the establishment of a coastal management policy as a subset of such a policy.

The Nigerian marine environment forms an important base for the economic development of the nation. Resources which abound in this area are wide and varied but are presently being exploited without coherent and efficient management policies. This has lead to conflicting uses and subsequent degradation. Integrated management proposals have been made in the past but only with particular reference to the coastal zone to address mainly the problems of sea level rise as a result of climate change and erosion. The problem is much greater than this as can be seen from the numerous problems that confront the Nigerian ocean environment. Many of these problems can be disastrous and irreversible. Nigeria has never seriously addressed these issues despite the consequences of making economic development and removal of poverty the primary concerns of policy makers.

Integrated Ocean Management of our ocean environment will help to ensure the efficient management and utilization of coastal resources for a sustained economic development.
Appendix 1: Nigerian Offshore Oil Fields.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Name of Oil Field</th>
<th>Production (in bopd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Adanga</td>
<td>3250</td>
</tr>
<tr>
<td>2.</td>
<td>Adua</td>
<td>10500</td>
</tr>
<tr>
<td>3.</td>
<td>Afia</td>
<td>9000</td>
</tr>
<tr>
<td>4.</td>
<td>Afremo</td>
<td>23300</td>
</tr>
<tr>
<td>5.</td>
<td>Agbara</td>
<td>15600</td>
</tr>
<tr>
<td>6.</td>
<td>Akam</td>
<td>3800</td>
</tr>
<tr>
<td>7.</td>
<td>Apoi North</td>
<td>28300</td>
</tr>
<tr>
<td>8.</td>
<td>Asabo</td>
<td>15150</td>
</tr>
<tr>
<td>9.</td>
<td>Asasa</td>
<td>20000</td>
</tr>
<tr>
<td>10.</td>
<td>Beniboje</td>
<td>5175</td>
</tr>
<tr>
<td>11.</td>
<td>Bogi</td>
<td>950</td>
</tr>
<tr>
<td>12.</td>
<td>Delta</td>
<td>19650</td>
</tr>
<tr>
<td>13.</td>
<td>Delta South</td>
<td>21900</td>
</tr>
<tr>
<td>14.</td>
<td>EA</td>
<td>30000</td>
</tr>
<tr>
<td>15.</td>
<td>Ebudugu</td>
<td>850</td>
</tr>
<tr>
<td>16.</td>
<td>Edikan</td>
<td>-</td>
</tr>
<tr>
<td>17.</td>
<td>Edop</td>
<td>50000</td>
</tr>
<tr>
<td>18.</td>
<td>Ekpe</td>
<td>9600</td>
</tr>
<tr>
<td>19.</td>
<td>Ekpe WW</td>
<td>7500</td>
</tr>
<tr>
<td>20.</td>
<td>Eku</td>
<td>3100</td>
</tr>
<tr>
<td>21.</td>
<td>Enang</td>
<td>23000</td>
</tr>
<tr>
<td>22.</td>
<td>Etim</td>
<td>17000</td>
</tr>
<tr>
<td>23.</td>
<td>Forcdos/Yoki</td>
<td>70000</td>
</tr>
<tr>
<td>24.</td>
<td>Funiwa</td>
<td>21600</td>
</tr>
<tr>
<td>25.</td>
<td>Iboho</td>
<td>10000</td>
</tr>
<tr>
<td>26.</td>
<td>Ime</td>
<td>-</td>
</tr>
<tr>
<td>27.</td>
<td>Inim</td>
<td>15000</td>
</tr>
<tr>
<td>28.</td>
<td>Inam</td>
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<tr>
<td>29.</td>
<td>Isan West</td>
<td>5300</td>
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<td>Isobo</td>
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<td>Iyak</td>
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<td>Iyak SE</td>
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<tr>
<td>33.</td>
<td>Kalaekule</td>
<td>20000</td>
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<td>Malu</td>
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<tr>
<td>35.</td>
<td>Mafa</td>
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<tr>
<td></td>
<td>Location</td>
<td>Population</td>
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<td>---</td>
<td>-----------</td>
<td>------------</td>
</tr>
<tr>
<td>36.</td>
<td>Meji</td>
<td>21750</td>
</tr>
<tr>
<td>37.</td>
<td>Meren</td>
<td>72500</td>
</tr>
<tr>
<td>38.</td>
<td>Mfem</td>
<td>4185</td>
</tr>
<tr>
<td>39.</td>
<td>Middleton</td>
<td>5500</td>
</tr>
<tr>
<td>40.</td>
<td>Mimbo</td>
<td>1500</td>
</tr>
<tr>
<td>41.</td>
<td>Odudu</td>
<td>6000</td>
</tr>
<tr>
<td>42.</td>
<td>Okan</td>
<td>50500</td>
</tr>
<tr>
<td>43.</td>
<td>Okubie</td>
<td>-</td>
</tr>
<tr>
<td>44.</td>
<td>Omon</td>
<td>7500</td>
</tr>
<tr>
<td>45.</td>
<td>Opobo</td>
<td>-</td>
</tr>
<tr>
<td>46.</td>
<td>Opuekeba</td>
<td>3350</td>
</tr>
<tr>
<td>47.</td>
<td>Oso</td>
<td>110000</td>
</tr>
<tr>
<td>48.</td>
<td>Parabe</td>
<td>10000</td>
</tr>
<tr>
<td>49.</td>
<td>Pennington</td>
<td>2200</td>
</tr>
<tr>
<td>50.</td>
<td>Robert Kiri</td>
<td>23000</td>
</tr>
<tr>
<td>51.</td>
<td>Sengana</td>
<td>-</td>
</tr>
<tr>
<td>52.</td>
<td>Tapa</td>
<td>12200</td>
</tr>
<tr>
<td>53.</td>
<td>Ubit</td>
<td>25000</td>
</tr>
<tr>
<td>54.</td>
<td>Ukpan</td>
<td>625</td>
</tr>
<tr>
<td>55.</td>
<td>Unam</td>
<td>9750</td>
</tr>
<tr>
<td>56.</td>
<td>Usari</td>
<td>-</td>
</tr>
<tr>
<td>57.</td>
<td>Utue</td>
<td>8650</td>
</tr>
<tr>
<td>58.</td>
<td>Yoho</td>
<td>8400</td>
</tr>
</tbody>
</table>

APPENDIX 2: Number of vessels entering Nigerian Ports including crude oil terminals: 1969 - 1988

<table>
<thead>
<tr>
<th>YEAR</th>
<th>NUMBER OF VESSELS</th>
<th>TOTAL (INWARD/OUTWARD) CARGO THROUGHPUT HANDLED AT NIGERIAN PORTS (CRUDE OIL EXCLUDED) IN TONS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969/70</td>
<td>3322</td>
<td>4227482</td>
</tr>
<tr>
<td>1970/71</td>
<td>2985</td>
<td>7309003</td>
</tr>
<tr>
<td>1971/72</td>
<td>4213</td>
<td>8113104</td>
</tr>
<tr>
<td>1972/73</td>
<td>4454</td>
<td>7562239</td>
</tr>
<tr>
<td>1973/74</td>
<td>4295</td>
<td>8475420</td>
</tr>
<tr>
<td>1974/75</td>
<td>4388</td>
<td>8441426</td>
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<tr>
<td>1975/76</td>
<td>4828</td>
<td>10999525</td>
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<tr>
<td>1976/77</td>
<td>5430</td>
<td>14405246</td>
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<tr>
<td>1977/78</td>
<td>6190</td>
<td>18114772</td>
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<tr>
<td>1978/79</td>
<td>6437</td>
<td>20075237</td>
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<tr>
<td>1980</td>
<td>6409</td>
<td>17957195</td>
</tr>
<tr>
<td>1981</td>
<td>6569</td>
<td>21389621</td>
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<tr>
<td>1982</td>
<td>5639</td>
<td>23642716</td>
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<tr>
<td>1983</td>
<td>4449</td>
<td>22611229</td>
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<tr>
<td>1984</td>
<td>3263</td>
<td>18741209</td>
</tr>
<tr>
<td>1985</td>
<td>3439</td>
<td>14651102</td>
</tr>
<tr>
<td>1986</td>
<td>3003</td>
<td>12274579</td>
</tr>
<tr>
<td>1987</td>
<td>2824</td>
<td>11537590</td>
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<tr>
<td>1988</td>
<td>3009</td>
<td>11283690</td>
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</table>

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>DATES</th>
<th>LOCATIONS</th>
<th>QS (total from all locations within stipulated dates)</th>
<th>QS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHELL</td>
<td>24/04/76 - 26/09/76</td>
<td>Bonny S.B.M&lt;br&gt;Bonny S.B.M One &amp; Two&lt;br&gt;Bonny Berth “Bee”&lt;br&gt;Bonny S.B.M Offshore&lt;br&gt;Forcados S.B.M. Two</td>
<td>13570.5</td>
<td></td>
</tr>
<tr>
<td>SHELL</td>
<td>30/01/77 - 24/06/77</td>
<td>Bonny S.B.M. One and Two&lt;br&gt;Bonny “Charlie” Berth&lt;br&gt;Bonny “Aye” Berth&lt;br&gt;Forcados S.B.M - one&lt;br&gt;Bonny Offshore Berth C</td>
<td>35.5</td>
<td></td>
</tr>
<tr>
<td>SHELL</td>
<td>23/02/78 - 20/10/78</td>
<td>Boon Offshore&lt;br&gt;Forcados S.B.M. One and Two&lt;br&gt;Bonny Offshore Berth C&lt;br&gt;Bonny S.B.M - One and Two&lt;br&gt;Forcados Terminal S.B.M One and Two&lt;br&gt;Bonny Bravo “Berth”&lt;br&gt;Forcados S.B.M&lt;br&gt;Bonny Offshore S.B.M&lt;br&gt;Forcados Offshore Berth</td>
<td>68473</td>
<td></td>
</tr>
<tr>
<td>SHELL</td>
<td>03/01/79 - 21/10/79</td>
<td>Forcados S.B.M. One &amp; Two&lt;br&gt;Bonny S.B.M One &amp; Two</td>
<td>29,865.82</td>
<td></td>
</tr>
<tr>
<td>SHELL</td>
<td>22/03/80 - 01/09/80</td>
<td>Forcados S.B.M. Two&lt;br&gt;Bonny Terminal&lt;br&gt;Forcados S.B.M&lt;br&gt;Bonny S.B.M&lt;br&gt;Bonny S.B.M Two&lt;br&gt;Bonny Berth “A”</td>
<td>104300.31</td>
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</tr>
<tr>
<td>MPN</td>
<td>06/02/76 - 30/09/76</td>
<td>Qua Iboe S.B.M&lt;br&gt;Asaba “A” Well Platform&lt;br&gt;Ubit Flare Structure&lt;br&gt;Usari “A” Platform&lt;br&gt;Eti M Platform&lt;br&gt;Asabo Production Platform</td>
<td>20003</td>
<td></td>
</tr>
<tr>
<td>MPN</td>
<td>06/11/77 - 16/11/77</td>
<td>Off Idaho Platform&lt;br&gt;Qua Iboe S.B.M</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>MPN</td>
<td>25/06/79 - 4/12/79</td>
<td>Off Idaho Platform&lt;br&gt;Enevo “A” Platform</td>
<td>34</td>
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</tr>
<tr>
<td>MPN</td>
<td>06/02/80 - 30/08/80</td>
<td>Qua- Iboe S.B.M. - Two&lt;br&gt;Eket</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company</td>
<td>Date</td>
<td>Details</td>
<td>Quantity</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
<td>---------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>GOCON</td>
<td>04/01/76</td>
<td>Meren Field</td>
<td>1,000</td>
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</tr>
<tr>
<td>GOCON</td>
<td>16/02/77 - 06/08/77</td>
<td>Escravos Berth - Nos 3 &amp; Escravos Berthing Facilities</td>
<td>2957</td>
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</tr>
<tr>
<td>GOCON</td>
<td>01/03/79 - 08/06/79</td>
<td>Escravos Offshore, Mejji Field, Isan Field, Okan Field</td>
<td>1,537</td>
<td></td>
</tr>
<tr>
<td>GOCON</td>
<td>14/05/80 - 14/05/80</td>
<td>Escravos Berth -2 &amp; Escravos Berth -3</td>
<td>70.44</td>
<td></td>
</tr>
<tr>
<td>TOPCON</td>
<td>19/07/77 - 15/07/77</td>
<td>SPV / SBM “A” &amp; Pennington</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>TOPCON</td>
<td>24/10/78</td>
<td>Oloibiri / Pennington</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>TOPCON</td>
<td>10/06/79 - 17/06/79</td>
<td>SPV Pennington &amp; Pennington Terminal</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>TOPCON</td>
<td>17/01/80 - 11/12/80</td>
<td>Funiwa Well No 5, MV Oloibiri, Pennington Production Platform &amp; Loading Berths Nos 2 &amp; 3</td>
<td>400,362.14</td>
<td></td>
</tr>
<tr>
<td>NAOC</td>
<td>26/03/77 - 17/05/77</td>
<td>Brass Terminal S.B.M - Two &amp; Brass Terminal S.B.M - One</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>NAOC</td>
<td>05/08/78</td>
<td>Brass Terminal S.B.M - Two</td>
<td>310</td>
<td></td>
</tr>
<tr>
<td>NAOC</td>
<td>15/08/79</td>
<td>Brass Terminal S.B.M - One</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

Source: Proceedings of Seminar on The Petroleum Industry and the Environment of the Niger Delta by the Federal Ministry of Housing and Environment; 1979 - 1980. (Data is compiled from the data presented to the seminar)

NB
1. SHELL - Shell Petroleum Development Company Nigeria Limited
2. NAOC - Nigerian Agip Oil Company Limited
3. GOCON - Gulf Oil Company Nigeria Limited
4. MPN - Mobil Producing Nigeria Limited
5. TOPCON - Texaco Overseas Petroleum Company Nigeria Limited
6. S.B.M. - Single Bony Mooring
7. S.P.V. - Special Purpose
8. Q.S. - Quantity Spilled
9. Q.R. - Quantity Recovered

TOTAL NOS OF OIL SPILLS = 131 BARRELS
TOTAL QUANTITY OF OIL SPILLED = 623,936 BARRELS
TOTAL QUANTITY OF OIL RECOVERED = 66 BARRELS
TOTAL QUANTITY OF OIL SPILLED = 623,871 BARRELS
Appendix 4: Agenda 21 - Adoption of Agreements on Environment Development (Agenda item 9-A/CONF.151/L.3/Add.17)

AGENDA 21

\[\text{Distr.}

\text{LIMITED}

A/CONF.151/L.3/Add.17

12 June 1992

ORIGINAL: ENGLISH

Agenda item 9

ADOPTION OF AGREEMENTS ON ENVIRONMENT AND DEVELOPMENT

Report of the Main Committee

Rapporteur: Mr. Bedrich MOLDAN (Czechoslovakia)

Addendum

Chapter 17

Protection of the oceans, all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources

1. The Main Committee considered chapter 17 of Agenda 21 at its 7th meeting, on 10 June 1992.

2. At the same meeting, the Committee approved the following amendments and recommended the chapter to the Conference for adoption as amended:

(a) Paragraphs 17.12 and 17.13 were replaced by the following text:

"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $6 billion including about $50 million from the international community on grant or concessional terms. These are indicative and order of magnitude estimates only and have not been reviewed by
Governments. Actual costs and financial terms, including any that are non-concessional, will depend upon, inter alia, the specific strategies and programmes Governments decide upon for implementation;

(b) Paragraphs 17.37, 17.38 and 17.39 were replaced by the following text:

"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $200 million from the international community on grant or concessional terms. These are indicative and order of magnitude estimates only and have not been reviewed by Governments. Actual costs and financial terms, including any that are non-concessional, will depend upon, inter alia, the specific strategies and programmes Governments decide upon for implementation";

(c) Paragraph 17.49 (h) was deleted.

(d) Paragraph 17.52 (e) was deleted and replaced by the following text:

"States should convene, as soon as possible, an intergovernmental conference under United Nations auspices, taking into account relevant activities at the subregional, regional and global levels, with a view to promoting effective implementation of the provisions of the United Nations Convention on the Law of the Sea on straddling fish stocks and highly migratory fish stocks. The conference, drawing, inter alia, on scientific and technical studies by FAO, should identify and assess existing problems related to the conservation and management of such fish stocks, and consider means of improving cooperation on fisheries among States, and formulate appropriate recommendations. The work and the results of the conference should be fully consistent with the provisions of the United Nations Convention on the Law of the Sea, in particular the rights and obligations of coastal States and States fishing on the high seas";

(e) Paragraphs 17.53 and 17.54 were deleted;

(f) Paragraph 17.68 was replaced by the following text:

"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $12 million from the international community on grant or concessional terms. These are indicative and order of magnitude estimates only and have not been reviewed by Governments. Actual
Governments. Actual costs and financial terms, including any that are non-concessional, will depend upon, *inter alia*, the specific strategies and programmes Governments decide upon for implementation*;*  

(b) Paragraphs 17.37, 17.38 and 17.39 were replaced by the following text:

"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $200 million from the international community on grant or concessional terms. These are indicative and order of magnitude estimates only and have not been reviewed by Governments. Actual costs and financial terms, including any that are non-concessional, will depend upon, *inter alia*, the specific strategies and programmes Governments decide upon for implementation*;*  

(c) Paragraph 17.49 (h) was deleted.  

(d) Paragraph 17.52 (e) was deleted and replaced by the following text:

"States should convene, as soon as possible, an intergovernmental conference under United Nations auspices, taking into account relevant activities at the subregional, regional and global levels, with a view to promoting effective implementation of the provisions of the United Nations Convention on the Law of the Sea on straddling fish stocks and highly migratory fish stocks. The conference, drawing, *inter alia*, on scientific and technical studies by FAO, should identify and assess existing problems related to the conservation and management of such fish stocks, and consider means of improving cooperation on fisheries among States, and formulate appropriate recommendations. The work and the results of the conference should be fully consistent with the provisions of the United Nations Convention on the Law of the Sea, in particular the rights and obligations of coastal States and States fishing on the high seas*;*  

(e) Paragraphs 17.53 and 17.54 were deleted;  

(f) Paragraph 17.68 was replaced by the following text:

"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $12 million from the international community on grant or concessional terms. These are indicative and order of magnitude estimates only and have not been reviewed by Governments. Actual
costs and financial terms, including any that are non-concessional, will depend upon, inter alia, the specific strategies and programmes Governments decide upon for implementation";

(g) The footnote indicator at the end of paragraphs 17.78 and 17.79 was deleted;

(h) The options offered in paragraph 17.83 or 17.84 bis were replaced by the following text:

"17.84 bis. States, in implementing the provisions of the United Nations Convention on the Law of the Sea, should address the issues of straddling stocks and highly migratory species, and, taking fully into account the objective set out in paragraph 17.78, access to the surplus of allowable catches";

(i) Footnotes 6/, 7/, and 8/ were deleted;

(j) Paragraph 17.96 was replaced by the following text:

"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $6 billion, including about $60 million from the international community on grant or concessional terms. These are indicative and order of magnitude estimates only and have not been reviewed by Governments. Actual costs and financial terms, including any that are non-concessional, will depend upon, inter alia, the specific strategies and programmes Governments decide upon for implementation";

(k) Paragraph 17.113 was replaced by the following text:

"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $750 million, including about $480 million from the international community on grant or concessional terms. These are indicative and order of magnitude estimates only and have not been reviewed by Governments. Actual costs and financial terms, including any that are non-concessional, will depend upon, inter alia, the specific strategies and programmes Governments decide upon for implementation";

(l) Paragraph 17.126 was replaced by the following text:

"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be
about $50 million from the international community on grant or concessional terms. These are indicative and order of magnitude estimates only and have not been reviewed by Governments. Actual costs and financial terms, including any that are non-concessional, will depend upon, inter alia, the specific strategies and programmes Governments decide upon for implementation”;

(m) Paragraph 17.137 was replaced by the following text:

"The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $130 million, including about $50 million from the international community on grant or concessional terms. These are indicative and order of magnitude estimates only and have not been reviewed by Governments. Actual costs and financial terms, including any that are non-concessional, will depend upon, inter alia, the specific strategies and programmes Governments decide upon for implementation”;

(n) The introductory phrase of paragraph 17.40 was replaced by the following text:

"National, subregional and regional action programmes will, where appropriate, require technology transfer in conformity with chapter 34 and financial resources, particularly where developing countries are concerned, including:”. 
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