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Inter-sectoral co-ordination and the legal framework to protect the Eritrean marine environment

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INTER-SECTORAL CO-ORDINATION AND LEGAL FRAMEWORK TO PROTECT THE ERITREAN MARINE ENVIRONMENT

By

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The State of Eritrea

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DECLARATION

I certify that all the material 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 not necessarily endorsed by the University.

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ABSTRACT

Title of Dissertation**:** **Inter-sectoral Co-ordination and Legal Framework to Protect the Eritrean Marine Environment**

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The dissertation is a study of the importance of inter-sectoral co-ordination and harmonisation at national as well as local levels among those involved in the coastal and Maritime activities and the establishment of institutional and legal framework for enforcement and compliance in order to achieve a sustainable development by protecting the marine environment.

As a first step, the study identifies the main sources of marine pollution in Eritrea and the impact of the pollutants to the marine resources and the environment are examined. The damage that had already happened and that is likely to happen on the marine resources and the environment is underlined as the result of weak institutional framework, lack of effective environmental and maritime legislation and lack of public awareness.

The present status and role of the different governmental, private and non-governmental organisations who have direct or indirect interests in the use of coastal areas and maritime transportation on the one hand and those who are interested in protecting the marine environment on the other are presented and assessed.

The concluding chapter contains a summary of the study and presents some important point concerning the subject for considerations and implementations by those who are responsible for the protection of marine environment.

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LIST OF ABBREVATIONS

ALECSO	Arab League Educational, Cultural and Scientific Organisation
BoD	Board of Directors
CIESIN	Consortium for International Earth Science Network
CITES	Convention on International Trade in Endangered Species
CLC	Convention on Civil Liability for oil damage
COLREG	Convention On the Regulation for the prevention of Collision at sea
DMT	Department of Maritime Transport
EAE	Eritrean Agency for the Environment
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ENGOs	Environmental Non-Governmental Organisations
FSC	Flag State Control
HNS	Hazardous and Noxious Substances
ICZM	Integrated Coastal Zone Management
IIUPL	International Institute for the Unification of Private Law
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organisation
IOPC	International Oil Pollution Compensation
IPIECA	International Petroleum Industry Environment Conservation Association
ITOPF	International Tanker Owners Federation
IUCN	International Union for the Conservation of NATURE
LC	London Convention
LL	International Convention on Load Line
MARPOL	International Convention for the prevention of pollution from Ships
MEPC	Marine Environmental Protection Committee
MMR	Ministry of Marine Resources

MTC	Ministry of Transport and Communication
NCP	National Contingency Plan
NEAP&G	The National Environmental Assessment Procedures and Guidelines
NEMP-E	National Environmental Management Plan for Eritrea
NGO	Non-Governmental Organisation
OPRC	The International Convention on Oil Pollution Preparedness, Response and Co-ordination
OSC	On-Scene Co-ordinator
PERSGA	Programme for the Environment of the Red Sea and Gulf of Aden
PM	Port Management
PMTA	Ports and Maritime Transport Authority
PSA	Particularly Sensitive Area
PSC	Port State Control
SDR	Special Drawing Rights
SOLAS	International Convention for the Safety of Life At Sea
STCW	International Convention on Standards of Training, Certification and Watchkeeping
UNCLOS	The United Nations Convention on the Law of the Sea
UNEP	United Nations Environmental Programme
UNESCO	The United Nations Education, Social and Cultural Organisation
WMU	World Maritime University

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CHAPTER ONE

1. INTRODUCTION

1.1 Background to the Study

Eritrea is one of the coastal States in the Red Sea having a coastline of about 1200 kms, second to Saudi Arabia. It has two main ports, namely Massawa and Assab, and over 350 islands. The two ports dominate the northern approaches to the Strait of Bab al-Mandeb. This strait joins the Gulf of Aden (and the Indian Ocean) to the Red Sea. (See Appendix 1) The name is primarily used by geographers to designate the narrowest part of the passage, about 14.5 miles (23kms) wide, between Ras Bab al-Mandeb on the Asian shore and Ras Siyan in Africa. At this point it is bordered on the east by the Yemen Arab Republic (North Yemen), and by the People's Democratic Republic of Yemen (South Yemen), and in the west by the Republic of Djibouti. About 14 miles (22 kms) farther north, where the Strait is nearly 20 miles (32 kms) wide, lies the coast of Eritrea, (…)." (Lapidoth, R E, 1982)

Moreover, Lapidoth, R E, 1982 went on to emphasise its physical features that:

> There is hardly any sea space in the world that is as unique as the Red Sea from the point of view of nature as well as history. It is one of the first large bodies of water mentioned in recorded history, and today it is a major traffic artery, serving on the one hand as an outlet to the oceans for its littoral States (for some of them it is the only outlet) and on the other hand as a thoroughfare that links the Mediterranean to the Indian Ocean. Four international waterways are connected to the Red Sea: access to the Mediterranean necessitates passage from the Red Sea through the Strait of Gumball and the Suez Canal; the way to the ports of Aquba (Jordan) and Eilat (Israel) from the Red Sea to the Gulf of Aden and thence to the Indian Ocean traverses the Strait of Bab al-Mandeb. The Red Sea, moreover, is the saltiest and one of the hottest open seas in the world, with a fascinating fauna and flora. It fills the rift caused by the geological movement of Africa away

from Asia, a relentless spread of the seabed started some 50 million years ago and still in progress.

The Red Sea area is designated as a “Special Area” in International Convention for the Prevention of pollution from ships (MARPOL 73/78). This designation is adopted due to its oceanographical (as it is semi-enclosed) and ecological conditions, and to the particular character of its traffic. The Red Sea is amongst the world’s busiest sea lanes (routes) for international, regional and national traffic of the countries bordering it and beyond. Hence, the Eritrean waters in particular, and the coastal States of the Red Sea in general, put a significant risk or threat from major accidents of oil and harmful and noxious substances on the marine environment. According to the Ministry of Marine Resources (MMR), 1994, in 1989 alone the traffic through the Red Sea was 90 million tons.

From the above description it can be understood that, specifically, the Eritrean archipelago islands with its coral reefs and other natural resources, and the marine environment are in danger from passing ships, even those that do not enter Eritrean ports, but could illegally discharge oil, or have major accidents, collisions or groundings that support the underdeveloped fishing industry of Eritrea, and are a major potential sources of eco-tourism. In addition to the potential threat of oil pollution that would arise from accidents or spills there are also other pollution threats that pose a threat to the marine environment caused by coastal developments, port operations and expansion, oil and gas exploration and oil terminal operations. The exploration of the marine resources and developmental projects on the one hand and the protection of the marine environment on the other lacks co-ordination and harmonisation among the different sectors involved. More importantly, due to the non-existence of enforcing institutions, out-dated maritime legislation and a critical shortage of skilled personnel has led to un-effective environmental management.

As Eritrea became an independent nation as recently as 1993, it is at an early stage in developing its maritime administration and maritime and environmental legislation. Currently, Eritrea has neither the organisational nor physical capability to respond and control marine pollution from oil and other harmful and noxious

substances. Eritrea has not yet ratified many of the international Conventions, particularly those related to marine pollution, and neither is it a party to the Regional Conventions for the conservation of the Red Sea and Gulf of Aden Environment and its protocol, 1982. It has also not developed its own Maritime legislation (Code), however it adopted temporarily the outdated Ethiopian maritime Code of 1960, which is as old as the SOLAS Convention of 1960 with some modifications and amendments.

Therefore, as can be seen from the above brief description, unless there is a co-ordinated and harmonised institution for an effective marine environmental management and legal framework for enforcement and compliance to the international and national standards, and regulation in protecting marine pollution from the land- and marine based sources, the Eritrean marine environment in particular, and the Red Sea in general, are at great risk.

In view of the above situation, what are the major sources of marine environmental pollution and their impact on the Eritrean marine environment? Are there sectoral co-ordination and institutions to protect and manage the marine environment from pollution? If not, what strategies or mechanisms are needed? Are there international marine pollution related conventions and national maritime legislation to protect the marine environment? If not, how can Eritrea incorporate the international conventions into its national laws and implement them?

This study analyses and examines the above questions and draws conclusions and makes the necessary recommendations to protect the marine environment.

1.2 Aims of the Study

In view of the above facts, and realising that pollution of the marine environment in the Eritrean waters in particular, and the Red Sea in general, by oil and other Harmful Noxious Substances (HNS) arising from human activities in the marine and coastal areas, particularly, by the improper, uncontrolled and uncoordinated involvement of governmental and private organisations in developmental and maritime transportation, a threat is posed to the marine environment, inter-alia, marine life, fisheries, human health, recreational uses of beaches and other amenities.

Thus, the author calls for sectoral co-ordination and harmonisation in coastal and marine developmental activities. However, the author believes in the need to ensure that economic development should not, in any way, cause damage to the marine environment taking into account the important role of the marine resources and their marine environment to the growth of the national economy of Eritrea.

Thus, this study is aimed at identifying the main sources and causes of marine pollution and analysing the institutional and national and international marine and environmental frameworks in the context of the national and international arena and provide strategies for marine environmental protection thereby presenting recommendations. Finally, the author puts forth recommendations directed to policy makers and administrators for action and implementation.

1.3 Objectives of the Study

- To analyse the importance of national institutional/sectoral co-ordination and harmonisation as well as regional and international co-operation;
- To assess the present national maritime and marine environmental legislation, regulations and institutions;
- To analyse the importance of the marine pollution related international conventions and recommend to incorporate them into the national laws of Eritrea taking into account the objective reality of Eritrea and its national maritime policy;
- To examine the national and regional oil spill contingency plans and the Integrated Coastal Zone Management as strategies for protection, reduction and response to marine pollution; and
- To assess the importance of sensitivity mapping in identifying the vulnerable marine resources and other amenities

1.4 Difficulties Encountered in Undertaking the Study

It is understood that the issue of marine environmental pollution that has been given attention by the public in the last few years around the globe is promising. However, Eritrea, as in many other developing countries the issue has only come to

attention since independence, i.e., in 1993. For the first time in November 1994, the then Ministry of Marine Resources (now Ministry of Fisheries) organised a conference, which was held in the port city of Massawa, addressing the issue of the marine environment. Later in 1995, the government of Eritrea prepared a National Environmental Management Plan for Eritrea (NEMP-E) addressing national wide environmental issues.

The environmental and maritime legislation in Eritrea are still in the process of drafting. The Department of the Environment which seems to be responsible for environmental matters at national level was established lately, in (1996?). Thus, the marine environmental protection in particular, and the environment in general, is yet to take root.

Therefore, past data and information dealing with the marine environment in Eritrea, such as, libraries, government/private organisations, and electronic media has had little or no information relevant to the topic of the study. For this reason, the author has had difficulty to find a base for critical analysis of the marine environment, institutional and legal situations in Eritrea.

1.5 Methodology of the Study

The methodology used in the study is primarily based on secondary data i.e., from previous studies which include the latest publications on the subject of the study by different maritime related organisations and governmental institutions at home and abroad plus lectures given at the World Maritime University (WMU), Malmö, Sweden.

Contacts have been made during the one month visit of the author to Eritrea with the Ministry of Transport and Communications (MTC) - Department of Maritime Transport (DMT); the Ministry of Energy and Mines; the Ministry of Environment, Land and Water - Department of Environment; the Ministry of Fisheries; the Ministry of Tourism and the University of Asmara. Interviews has been conducted with the concerned authorities and experts of the above mentioned Ministries/Departments. Draft documents and unpublished reports from the above

concerned departments were utilised to describe the current condition of marine environmental protection and legislation issues in Eritrea.

In addition, during field studies to various countries i.e., to the Scandinavian countries, England and Germany, interviews were also conducted with different experts of those countries on the subject matter. Most importantly, regular interviews with the resident and visiting professors, especially with the author's supervisor and course professor at WMU were also conducted and provided relevant and important materials to be utilised in the study.

1.6 Scope of the Study

The analysis of the study is intended to draw the attention and awareness from the top level in particular, and the public, in general, regarding the environmental impact of human activities on the marine and coastal areas. It also examines the importance of sectoral co-ordination and legal framework to protect the marine environment.

Thus, the discussion of the study is arranged in six chapters. The background, aim and objectives of the study highlighting the threats of importance of the protection and preservation of the marine environment are addressed in **chapter one.**

Chapter two identifies the land - and marine-based sources of marine pollution and examines the status of the marine environment in Eritrea.

Chapter three examines the present situation of the different governmental and private organisation's role in protecting the marine environment.

Chapter four examines the current status of national maritime and environmental legislation in Eritrea and analyses the importance of ratifying the international marine pollution related conventions and their incorporation into the national laws of Eritrea in order to protect and preserve the marine resources and its environment.

Chapter five presents different strategies in protecting the marine environment by responding to oil and other harmful and noxious substances spill as a result of accidents. It also analyses the importance of co-ordination and co-operation among the different governmental and private organisations for effective marine environmental management through Integrated and Coastal Zone Management (ICZM) to ensure sustainable development. Moreover, it underlines the importance

of regional and international co-operation, especially the Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment; and its protocol (1982).

Chapter six finalises the study by presenting conclusions and recommendations drawn from the study. It summarises the vital points of the subject matter for consideration and implementation by the policy makers and administrators, particularly those who are responsible for marine environmental matters.

CHAPTER TWO

2. MAIN SOURCES OF MARINE POLLUTION AND THEIR IMPACT ON THE MARINE ENVIRONMENT

2.1 Background

For many years in the past it was assumed that the oceans and seas of the world have unlimited capacity to absorb wastes from land-based and marine-based sources. However, since a few years back, the world community seems to have changed this assumption because of the fact that the marine environment has already been polluted to an intolerable level. Therefore, it is now recognised that pollution is a very serious hazard to marine life and its environment as well as human life which is directly or indirectly threatened by its effects.

The coastal zones are under severe threat, more than the open seas, for it is a fact that the former are generally shallower and less mixed than the latter. Coastal zones are more recipient of various types of pollutant because most marine pollution originates on land and reaches the shore such as via sewage pipelines, rivers and dumping.

Therefore, due to the economic and ecological factors of the coastal areas, great attention must be given in particular by the concerned authorities, and in general by the public. However, giving attention to the growing concern alone is not a sufficient condition by itself. Rather, sound environmental policies, sectoral and regional co-ordination and effective marine environmental protection strategies should be laid down to reduce marine pollution especially, from the point source such as industrial, domestic, and ship sources, among others.

Eritrea, to date, has not a significant damage to the marine environment from both marine and land-based sources. Furthermore, it has no record of any major pollution

incidents from vessels except that there have been groundings of cargo vessels and traces of oil spills along the coastline of Assab and Massawa port areas caused by oil terminal operational leakages and ship operations. However, there is great concern regarding pollution from the land-based sources, particularly because of the direct discharge of sewage wastes into the sea and due to the heavy traffic of tanker vessels through Eritrean waters.

Hence, there is a potential threat to the marine environment. Some of the main potential threats are:

- The increase of oil tanker traffic passing close to Eritrean coastal waters;
- The prospective off shore oil and gas exploration and drilling activities;
- The modernisation, expansion and construction of ports, oil terminals, and ship repair yard. The investment in various projects such as the fishing industry, tourism industry and other construction works along the coastline; and
- The increase of population in the coastal areas.

Therefore, taking the virtually semi-enclosed nature of the Red Sea into consideration, it is timely and important to take a precautionary action to prevent and control the marine environmental pollution from the point of sources.

The aim of this chapter is to identify and analyse the sources of marine pollution and their impact on the marine environment. The main sources of marine pollution and their impact are discussed below.

2.2 Marine-Based Sources of Pollution

The main sources of marine pollution can be classified into two categories i.e., the marine-based and land-based sources. The Eritrean marine environment is threatened by oil and Hazardous and Noxious Substances from both marine-and land-based sources of pollution. Marine-based oil pollution can originate either from ships or from offshore/onshore installations caused by accidental or operational matters.

It is also more usual to use the word pollution in a sense that excludes natural seepages that cause oil pollution. The most widely used recent definition of oil pollution is that adopted at the 1972 United Nations Conference on the Human Environment: ‘The introduction by man, directly or indirectly of substances or

energy into the marine environment (including estuaries) resulting in such deleterious effects as harm to living resources, hazards to human health, hindrance to marine activities including fishing, impairment of quality for use of sea water, and reduction of amenities.' The different sources of marine-based sources of pollution are the following:

2.2.1 Maritime Transportation

The increase in shipping traffic, especially the volume of oil tankers passing through the Red Sea in general, and the Eritrean territorial waters in particular, pose a greater threat on the marine environment.

According to IMO, 1983, the crude oil tanker routes from the Middle East supplying Eastern and South Eastern Africa are carrying approximately 6.5 million tons of crude oil per annum. Another route is from the Middle East ports through the Gulf of Aden, the Red Sea and the Suez Canal with an estimated 100 million tons of crude oil per annum and supplying of approximately 8 million tons of crude oil per annum to Aden, Assab and port Sudan. These are the three major crude oil tanker routes in the region.

Thus, this shows us that Eritrea is situated on one of the major oil tanker routes of the world. The figures above are sufficient indications for the possible risk of marine pollution from maritime causalities and shipping operations such as tank washings, discharge of oily ballast and waste from ships. Therefore, Eritrea needs to prepare a national oil spill contingency plan in order to be able respond to oil and other harmful and noxious substance spills. In addition, co-operation and co-ordination with neighbouring coastal states is also important.

2.2.2 Accidental Pollution from Ships

Oil pollution of the sea began with the introduction of oil fuel in ships. It increased with the carriage of oil cargo in bulk, and it has been increasing ever since. This rapid increase goes hand in hand with the exploration and exploitation of oil caused by the high demand of oil consumption.

As a result, a series of oil accidents, some with devastating consequences for the environment, has shown that despite the efforts of all member states exerted to

prevent ship accidents, a tanker accident cannot be entirely precluded. The reason is that technical and human error, for example, can never be completely excluded. So it is clear that we must exploit all possibilities to take precautionary measures such as an effective port state control in order to prevent, control and respond to the damage of the environment or at least to keep such damages as small as possible, and thereby avoid or minimise the consequential costs.

There is no major record of an oil tanker incident in the Red Sea except a few serious spills. However, the potential risk of an oil incident from the increasing traffic of oil tankers and oil prospecting (exploration and exploitation activities) remains very high. The potential threat to the marine environment in this region can be seen from the following figures: '90 million tons in 1989' (Lundn, 1998) and '78 million tons in 1992' (Menghisteab, 1996) of oil tanker traffic has been transported through the Red Sea.

Past accidents involving oil pollution entailed considerable consequential costs. We can learn lessons from past incidents occurring, for example, on the northern coast of France and in the area of the port of Hamburg.

"The costs involved in removal of the damage caused by 230,000 tons of oil spilled by the 'Amoco Cadiz' off the coast of northern France, which were estimated at approximately five thousand million DM (legal claims), and two other incidents in the area of the port of Hamburg. The 'Afran Zenith', for example, caused damage of 6.5 million DM as a result of 200 tons of spilled oil, and an accident of the 'Ondina' with the same quality of spilled oil, caused damage of more than 20 million DM." (Ölunfallausschuss, 1984).

2.2.3 Operational Pollution from Ship

Marine pollution from ships is of two major categories: accidental/operational or intentional. The Chances of accidental pollution may be reduced by adoption of certain procedures, for instance, navigation, loading and unloading, among others. On the other hand, intentional pollution may be reduced by resorting to strict liability as well as by providing alternative reception facilities for oil at ports and harbours. Therefore, these aspects ought to be mentioned and accentuated in the legislation.

Due to great variety of cargoes carried by ship and due to the use of different kinds of fuel for the functioning of the propulsion engines and other auxiliary equipment, ships are important elements of marine pollution.

The main objective of the International Convention for the Prevention of Pollution from ships (MARPOL 73/78) is to prevent pollution of the marine environment from different types of pollutants. These pollutants have been categorised into 5 annexes under MARPOL 73/78 Convention. The annex of the Convention contains regulations of all technical matters of pollution that are generated from ships, except the disposal of waste into the sea by dumping. These annexes regulate the prevention of:

(a) pollution by oil (Annex I);

(b) pollution by noxious liquid substances in bulk(Annex II);

(c) pollution by harmful substances carried by sea in packaged form. (Annex III);

(d) pollution by sewage from ships (Annex IV); and

(e) pollution by garbage from ships (Annex V).

At present, other pollutants from ships are matters of general attention for their impact on the marine environment, such as, alien species in the ballast water, anti-fouling substances in the paint of ships and underwater noise from ships.

In general, the MARPOL 73/78 Convention prohibits any discharge by ships when they are at sea or in port of the substances defined in each annex except the conditions specified in the regulations are satisfied. The basic principle of MARPOL is that only very limited discharges of the substances covered by it are permitted. An exception is made for discharges due to *force majeure*, such as those necessary for the purpose of securing the safety of a ship and those on board or for saving life at sea.

Any oil tanker and other ships of 400 tons gross tonnage and above, are allowed to discharge oil machinery spaces billges outside a special area if the following conditions are satisfied:

- The ship is proceeding en route;
- The oil content of the effluent with out dilution does not exceed 15 parts per million (PPM); and
- The ship in operation should have an oil discharge monitoring and control system, and oil filtering equipment or other equipment as required by regulation 16 of the annex I of MARPOL 73/78.

However, regardless of these regulations many ships continue to discharge wastes into the sea either intentionally or unintentionally. Anyone can imagine how difficult it is to control the illegal discharges, particularly when the ship is at sea far from the coast. In this situation the marine environment is at risk.

Though, the marine environment of Eritrea has not been so much affected to date by such illegal discharges, there have been some cases of oil discharges. However, the main serious problem that affects the Eritrean marine environment is the lack of reception facilities. Therefore, unless the Eritrean ports and the oil terminals are equipped with the necessary reception facilities, marine pollution will continue to happen.

The problem of the lack of reception facilities becomes of great concern, particularly in the case of ships carrying chemicals in bulk, oil tankers and passenger ships. Usually, the most common marine pollution incidents that occur at the port and oil terminal operations are during loading and unloading. Hence, in handling chemicals in bulk and oil, without having reception facilities, affects the marine environment. Another critical problem that can be taken into consideration is regarding ballast water, sewage and garbage generated from ships. Whenever a ship needs to get rid of wastes, reception facilities for disposal are also required. Loading/unloading and the transfer of oil and other substances transported by ships may lead to accidental discharge at ports, but there may also be deliberate discharge of oil and other wastes from ships. These may be particularly widespread where there is a lack of receptacles for such wastes at the harbour. Then if reception facilities are not available at the ports of call then seafarers are likely to discharge illegally at sea.

So, to avoid such illegal discharges of waste into the sea, the availability of reception facilities is of great importance.

Even though Eritrea is fully aware of the importance of the MARPOL 73/78 Convention, the ratification and implementation is not possible in the immediate future. It is not essential that the convention be ratified before implementation. However, Eritrea is taking the necessary measures in compliance with the Convention without ratifying it in order to protect the marine environment.

Nevertheless, in the light of the existing and proposed oil and gas prospects, coastal development and other maritime activities, it is crucial and timely important to ratify and implement the Convention.

2.2.4 Environmental Impact of Offshore Oil and Gas Exploration Activities

The ever expanding exploration for, and exploitation of, offshore oil and gas resources that has been taking place in many parts of the world against the need for environmental protection and sustainable development has been increasingly brought to the forefront. The focus of these activities, which was originally concentrated on near-shore, shallow-water prospects, has expanded to include areas of deep water and severe environmental conditions. In parallel with this expansion, exploitation of petroleum resources continues to develop in environmentally vulnerable areas such as enclosed and semi-enclosed seas (e.g., the Red Sea).

The fact that the above mentioned activities have not always been without ecological side effects has led to the close examination of key operational practices, with the aim of improving the environmental performance in offshore exploration, exploitation or production activities.

In general, the benefits of adopting practices that protect the environment are widely recognised by regulators and operators alike. This recognition has contributed to the development of a variety of regional and national regulatory instruments, as well as to the development of self-regulation guidelines produced by the operators and non-governmental organisations.

Currently, Eritrea has undertaken with the Anadarko Co. exploration activities to prospect oil and gas in its coastal waters by. It has undertaken the drilling of three

consecutive exploratory wells: “The first two well locations are the Bulissar prospects in the Zula Block and the Edd prospect in the Edd Block. After the first two wells, a third well site will be chosen from among three possible sites in the Zula Block, these are the Du Rig prospect, the Ghedele prospect, or the Ras Shakes prospect. Water depths at the potential well site range from 56 to 79 meters.” (Anadarko Co., 1998)

Therefore, these offshore oil exploration activities in Eritrean waters may result in a variety of environmental impacts. In view of this, follow-up and control is required by the government of Eritrea to ensure that the offshore oil exploration comply with the requirements of environmental standards and the relevant laws of Eritrea.

The offshore, oil and gas activities are divided into two phases, the initial phase that involves exploration and drilling, and the second phase involves production and transportation. Each of these activities has an impact on the environment.

2.2.4.1 Environmental impact of exploration stage

The offshore oil and gas exploration activity may have an impact on the environment, especially at a local level. The use of air-guns in seismic surveys may have an adverse effect on the fish stocks and fish farming. It is also believed that noise from vessels, rather than the seismic signals, is suspected as having an impact on fish (breaking up shoals). On the other hand, the movement, installations, and operation of a platform or pipeline causes localised physical distributions. Moreover, ecological disturbances may affect the natural resources and thus, the economy of local communities (e.g., fisheries). “The extent of the effects exhibit both spatial and temporal variations, depending on factors such as:

- The planning and implementation of activities;
- The application of preventive measures and technologies; and
- The characteristics of the local environment. ” (IMO, 1998)

Proper planning, design and control of each phase in the operation, taking into account the environmental aspects of the activity as an integral part of the business, can help to avoid, minimise or mitigate the impacts.

Eritrea has not yet designated a Particular Sensitive Area (PSA) or marine protected areas though there have been intentions to do this. Hence, the exploration activity is likely to affect the marine environment, particularly the sensitive habitats and shorelines. Therefore, Environmental Impact Assessment (EIA) and baseline studies should be made prior to exploration activities in order to identify the environmental sensitive area and predict the impacts. In addition, the EIA process should take into account the cumulative effects of the pollutants. Areas vulnerable to the impacts of offshore oil and gas, and environmentally sensitive areas should be adequately protected. Such areas need to be determined at a local, national or regional level, as appropriate.

2.2.4.2 Environmental impact of drilling stage

Considerable environmental concern exists with regard to the potential impact of discharged drilling wastes on marine life. In particular this concern is related to the discharge of oil-contaminated drill cuttings, large diesel spills, blow outs and crude oil spills which have an adverse effect on the environment. Therefore, in order to prevent, control and respond to accidental hydrocarbon spills, it is necessary to prepare an oil spill contingency plan, have oil pollution equipment and the required trained personnel. Drilling mud discharges increase water turbudity with a suspended solid in the water column and reduce light penetration. The impact is that this reduces the process of photosynthesis and interference with zooplankton and fish feeding.

The mud that is used in the drilling operations for the lubrication of the drilling string and for maintaining the pressure needed to prevent the escape of oil from the well has an adverse effect on marine organisms in the locality resulting from the containment of toxic chemicals and oil.

"Waste discharges from the drilling platform also affect the marine environment. Contaminated drill-cuttings and other waste, therefore, should be taken offshore for treatment and disposal. In general, possible methods of reducing the environmental impacts of drilling wastes include:

- Reducing waste volume by increased recycling of muds and chemicals;

- Avoiding drilling in sensitive areas by using directional drilling (horizontal drilling and extended reach) techniques to assess the reservoir from a less sensitive area; and
- Cluster drilling to minimise the 'footprint' of the platform." (IMO, 1998)

2.2.4.3 Environmental impact of production stage

During oil and gas production operations a large volume of produced water is brought to the surface along with oil. Although water is always present in oil producing formations, in the early stages of production water may only be a minor component of the fluids produced. However, as the reservoirs become oil-depleted, the volume of water produced increases, while the pressure within the reservoir decreases. In order to maintain pressure and sustain existing production rates, water may be injected into the reservoir. This injected water may be subsequently recovered as produced water.

In the later stages of production, the volume produced water is generally several times greater than that of the oil, making produced water, volumetrically, the largest waste stream from offshore oil production platforms.

The produced water is a complex mixture, which may contain hydrocarbons, naturally occurring radioactive material, production chemicals, inorganic salts, solids and metal salts. Therefore, this contaminated produced water has a negative impact on the marine environment. Thus, it should be treated (i.e., oil/water separation) before being discharged into the marine environment. Maximum impact reduction requires the optional utilisation of existing technology and resources.

2.2.4.4 Environmental impact of transportation stage

The greatest risk to the marine environment is accidental oil pollution. In terms of quantity the most important type of oil transported around the oceans is crude oil. Crude oil is a mixture of individual organic chemicals. This may vary in nature from those that are gases or volatile liquids at ambient temperatures to those that are semi-solid tarry or waxy substances. Some of the chemicals in crude oil, particularly the lighter, more volatile ones are quite toxic to marine life, whereas the heavy residues are comparatively inert.

The effects that crude oil have on marine systems fall broadly into two categories: toxic effects and smothering effects. Toxic effects are generally short lived because they are largely due to volatile or water soluble oil fractions which are rapidly lost from a crude oil slick by evaporation or water currents. The organisms affected are therefore most likely to be plankton or fish eggs or fry that lack the mobility to escape while smothering effects are of greatest importance when oil is washed ashore. Coastal zones are highly biologically active and few plants or animals can resist a severe coating of oil. The disruption of the ecological balance of a coastline by a beached oil slick may last for a considerable periods of time (1-10 years). It is not only beach dwelling plants and animals that are harmed by oil slicks but also fish, birds, mammals (seals, manatee, even sheep) have all suffered from oil pollution incidents in the past. Oil is quite persistent in the marine environment. Whilst light oil fractions disappear quickly, tarry residues may last for years and may be carried thousands of miles from their sources as tar balls.

On the other hand, oil can be distributed through submarine pipelines from the production platforms or marine terminals to commercial distribution systems. In the case of breakage of the pipelines caused by shipping or fishing activities, then the oil spill can affect the marine organisms and damage the environment. In addition, corrosion of the pipelines can cause oil spills. There can be a potential risk from operational leakages or from accidents of oil tankers during loading operations. Hence, preparing an oil spill contingency plan is necessary.

2.3 Land-Based Sources of Pollution

Although, marine-based sources is one of the causes for marine pollution, more than half of the causes of pollution to the marine environment originate from a variety of land-based sources. The various components of such pollution include wastes from industrial and commercial establishment, agricultural runoff, municipal and domestic wastes. The greatest concern of marine pollution from the land-based sources is that of the deliberate dumping or discharge of wastes into the sea which has been regarded as an eternal dumping site.

The artificial chemicals from the farm fields and natural fertilisers transported by floods into the sea are also of great concern to marine environment. In addition to these challenges, marine pollution from land-based or marine-based sources is inseparably linked to other socio-economic development projects, such as tourism development, fishery developments, port or terminal developments, oil and gas exploration and construction works.

The United Nations Environment Program (UNEP), 1992 on Industry and Environment emphasised that the greatest portion of the marine pollutants comes from land, while shipping accidents represent only a small part. UNEP argued that:

> Starting with the scientific basics, all marine pollution - indeed all material entering the seas, whether polluting or not - comes originally from land. And the natural flux is vast. Rivers have delivered tens of billions of tonnes of suspended and dissolved material to the seas annually over the geological ages. Indeed the sedimentary rocks upon which most people live are proof of the enormous amount of 'land' that has washed into the sea, only to be uplifted and turned once more into land.

Table 1. Estimate of the relative contribution of different human activities to marine pollution

Source	**% of all potential pollutants**
Run- off & land- based discharges	44%
Atmosphere	33%
Maritime transportation	12%
Dumping	10%
Offshore production	1%

Source: UNEP, 1992 on Industry and Environment

This table shows that more than three-quarters of marine pollution comes directly from land, whether by rain or air because most atmospheric inputs are from land-based sources. Strictly speaking, even this is an underestimate because most marine dumping is of land-generated industrial waste or land derived dredged silt. However,

table 1 excludes the natural flux of the sediments and dissolved substances from land to sea. On the other hand, dumping is generally categorised as a marine source of pollution, for example in legislation.

Thus, the solution to these problems lies in what alternatives are available and what strategies are to be taken? The main sources of marine pollution from land-based sources are described below.

2.3.1 Domestic wastes

2.3.1.1 Sewage (liquid waste)

One of the major pollutants of the marine environment which has a land-based source is sewage. It may contain any kind of substances such as chemicals from detergents that are harmful to the marine organisms.

According to Dr. Martin, (1998) the disposal of sewage into the sea has caused a serious consequences to the marine environment and to human health. He states that:

> Sewage disposal has been a problem ever since humans started to live in large communities. Options for the disposal of sewage on land are limited and for many years, rivers, estuaries and the seas have been used as a means of solving the problem. Unfortunately, sewage has a high oxygen demand and has serious harmful effects from oxygen depletion and excessive nutrient concentrations. If raw sewage is treated to reduce its environmental impact there are two products. First, an effluent with a low oxygen demand which can normally be safely discharged and second, sewage sludge which is not infrequently taken out to sea and dumped at designated sites. Sludge has a high oxygen demand and may cause localised oxygen depletion in zones where mixing processes are insufficient to replenish oxygen, especially during summer where the temperature is high. If oxygen depletion occurs then some fish species may avoid the area. But if oxygen supplies are adequate the falling organic matter may act as a food source. Metals and chlorinated hydrocarbons are more important contaminants associated with sludge through many other potentially toxic organic or inorganic compounds may be present. It is not uncommon for contaminant concentrations in animals from sludge dumping areas to be 10-100 times than those in areas more

isolated from pollution sources, because this contamination may find its way back to human consumers. There is obviously concern about the levels of such chemicals in sludges.

Along the Eritrean coastline of about 1200 kms, "the total population is about 200,000, mostly around the ports of Massawa and Assab." (Lundan, 1998). Most of the Municipality's sewage system is discharged into the sea without any treatment. Though, the disposal of waste is small compared to coastline's length and the population, the authorities concerned, particularly the municipalities, should take effective steps and enforcement procedures to prevent the disposal of waste.

2.3.1.2 Garbage (solid waste)

Solid wastes are garbages of all kinds such as household and industrial wastes. The most harmful solid wastes to the marine environment are the non-biodegradable plastics, batteries with mercury content, heavy metals and paint tins among others. These solid wastes are deliberately dumped into the sea and/or transported by running water during winter.

The increase of waste disposal into the sea is directly proportional to the increasing demand of coastal developments and the subsequent increase of the population. Therefore, these increasing trends pose a great threat to the Eritrean marine environment and need urgent priority.

2.3.2 Industrial wastes

At present, the discharge of industrial wastes into the sea is very limited, as there are few factories located in the coastal areas. These are the cement and salt factories located at Massawa. However, the waste from these factories can have different chemical contaminants that affect the marine environment. For example, the cement factory generates a large amount of dust particles from the raw mill and cement mill. "It is estimated that about 1-2kg/hr solid waste dust particles could leave the unit to the surroundings." (MMR, 1994) Hence, it is important that the factory should treat the dust particles be relocated far from the coast to avoid environmental damage.

2.3.3 Agricultural Run-off

Marine pollution borne by agricultural run-off is caused by the introduction of inorganic chemicals used as fertilisers and pesticides on the farmland into the sea. In addition to the inputs of inorganic chemicals, another problem is the riverborne marine pollution caused by industrial and municipal wastes through deliberate discharge into rivers or water run-off and/or transported from the fields into the river or water run-off.

This problem is serious during winter when there is heavy rainfall. The problem of agricultural run off is also aggravated by deforestation and poor land-use practices that cause soil erosion. Therefore, the Ministry of Agriculture should play a great role in introducing modern land-use practices and keeping the balance of inputs of fertilisers on farmlands to reduce marine pollution.

2.3.4 Tourism Development

The marine environment is the main natural resource on which the tourism industry depends. However, unplanned tourism development greatly affects the natural habitats and the environment particularly the most sensitive marine habitats.

Currently, the tourism industry in Eritrea is not developed, though it has a long coastline with attractive beaches and about 350 small and big islands with different types of fish and coral reefs. Coastal tourism and diving possibilities are significant all along the Eritrean coast, particularly in the coast around Massawa where few hotels are available.

During summer, many foreign and local tourists visit the coast of Massawa. According to Lundin, (1998) approximately 240,000 tourists, of whom about 200,000 were expatriate Eritreans, visited Eritrea and most of them went to the coast for a few days. So the flow of foreign and local tourists, particularly in the summer time, has an effect on the marine environment. There are plans to develop the tourism industry in the coastal areas. However, the government has placed a high priority on the protection of the marine environment side by side with the coastal development plans.

The government has established generally sound priorities for the sustainable development of coastal areas. In order to achieve this objective the Ministry of Marine Resources, in 1995 drafted an Integrated Coastal Zone Management (ICZM) proclamation. However, this draft proclamation has not yet adopted. Therefore, it is important to take immediate action for their implementation. In addition, prior to the implementation of any development projects in the coastal areas an environmental impact assessment (EIA) should be made.

2.3.5 Port Development

Port/terminal developments have a negative effect on the marine resources and the environment, especially due to the dredging of the seabed that damages the fragile ecosystem such as fish and other coral reefs. In addition, during the operation of loading/unloading the spillage of oil and other hazardous substances may contaminate the water and, as a result, this affects the fish and other marine life. This in turn affects human health when eating the contaminated fish.

The United Nations, 1992 on assessment of the environmental impact of port development states that:

> Port development may create a wide ranges of imports on the environment by dredging and its disposal, construction works, landfills, discharge from ships and water front industries, cargo operations and other port related activities. The potential adverse effects of port development encompasses water pollution, contamination of bottom sediments, loss of bottom habitat, damage to marine ecology and fisheries, beach erosion, current pattern changes, waste disposal, oil leakage and spillage, hazardous materials emissions, air pollution, noise, vibration, visual pollution and other unhealthy socio-cultural impacts.

On the other hand port/terminal development projects need a larger area of the coast for construction work and landfills, operational activities, warehouse and offices buildings. Hence, these activities lead to the destruction of marine plants such as mangroves. Therefore, the habitats of marine life dependent upon mangroves such as crabs, molluses and young fish that feed there at high tide, and birds which in turn feed on them are likely to be affected.

CHAPTER THREE

3. THE ROLE OF GOVERNMENTAL AND PRIVATE INSTITUTIONS IN PROTECTING THE MARINE ENVIRONMENT

The protection of the marine environment needs the collective efforts of all government bodies and the public. The harmonisation of the environmental legislation with the coastal zone management legislation remains a large task that will require all parties to be engaged in active dialogue and co-operation.

Eritrea is endowed with very rich marine resources and pristine beaches. The protection and preservation of the marine resources and the environment can promote the national economy of Eritrea. On the other hand, the need for industrial, agricultural, fishery, tourism construction, oil terminals, maritime transport (ports and shipping) developments and oil and gas exploration and exploitation are increasing steadily, which may have an adverse effect to the marine environment. Therefore, the protection of the marine environment on the one hand and the economic development on the other hand, has the potential to result in frequent conflicts between the interested parties. Thus, the co-ordination and harmonisation of these two conflicting interests becomes a very difficult and complicated task to overcome. Nevertheless, it is important to create a spirit of co-operation, co-ordination and environmental awareness among the different governmental and private sectors involved in the coastal and marine activities to enable them to incorporate environmental policy in their sectoral development policies according to the national environmental policy. In addition, the role of the Environmental Non Governmental Organisations (ENGOs) is of vital importance to create industrial and public environmental awareness by interacting with the concerned governmental, private sectors and individuals.

> In principle, an Environmental Impact Assessment (EIA) system could apply to all actions likely to have significant environmental impact, irrespective of their type. Thus, the potential scope of a comprehensive EIA system could encompass the approval of policies, plans, programmes and projects at all levels of government.
>
> The objective of EIA is not to force decision-makers to adopt the least environmentally damaging alternative. If this is the case, few developments would take place. Environmental impact is but one of the issues addressed by decision-makers as they seek to balance the often competing demands of development and environmental protection, social economic factors my be far more pressing. (O'Sullivan, 1996)

Furthermore, a complete protection of the marine environmental pollution in respect to the necessity for economic development in Eritrea is impossible. Pardo F, (1998) states that:

> The pollution is a concept tightly connected to the industrial development and a total elimination is quite impossible without affecting the countries development and without interfere in comfort of live of present generations. It is difficult to eliminate the facilities that modern live offer us for instance electrical light, houses, cares, planes, computers, medicine, clothes, etc., all of them being source of pollution during their manufacture.
>
> Considering the difficulties for a total elimination of pollution, our efforts should be focused on its prevention and reduction through the design of advanced techniques for the extraction of substances, elaboration of products and their handling, transport and storage, in order to minimise pollution and to achieve a sustainable development.

The aim of this chapter is to assess the role of the different governmental and private sectors involved in the coastal and offshore activities and the role of the environmental protection enforcing agency i.e., the department of Environment and the environmental friendly Non-Governmental Organisations (NGOs). However, the author has limited amount of information regarding a clear definition of duties and responsibility of the above departments. As a result the discussion is limited.

3.1 The Role of the Department of Maritime Transport

After the defeat of the Ethiopian regime in May 1991, the then provisional government of Eritrea established the Eritrean Maritime Administration called the Department of Ports and Maritime Transport (DPMT) by proclamation No. 23/92, Art.7 NO. 1.17. The department was established to develop, improve, maintain, operate and regulate the port and the shipping industry in Eritrea. In May, 1993 the DPMT was re-established by a legal notice No. 14/1993 Art. 2(16) as Ports and Maritime Transport Authority (PMTA) and placed directly under the Office of the President with headquarters in Asmara, the capital of Eritrea. The PMTA was legally responsible for :

- All Port activities in Massawa and Assab;
- A ship Repair Yard in Massawa; and
- Eritrean Shipping and Transit Agencies in Assab and Asmara.

For a short time PMTA was also responsible for the Eritrean Shipping Line which later became a private company. In 1995 all governmental institutions /Ministries made a restructural adjustment and streamlining of civil servants. Accordingly, the PMTA was re-established as the Department of Maritime Transport (DMT) within the Ministry of Transport and Communications. It mainly focuses on the regulatory functions while leaving aside the commercial activities to the port administrations.

The ports of Massawa and Assab, the shipping and transit agencies and the ship repair yard has been given an autonomous status headed by a Board of Directors (BoD) which defines the guidelines and objectives for the Port Manager (PM) and supervises the port management's performance. This is a step towards the privatisation of these enterprises.

The DMT is headed by a Director General who is directly responsible to the Minister of the Ministry of Transport and Communications (MTC). The DMT is the main liaison between the MTC/the government and the Ports Management in matters of government relations, and strategic planning of port policy. The DMT organisational structure has four Divisions and eleven Units.

The Department of Maritime Transport is responsible for, inter alia:

- Prevention of marine pollution and safety of ships at sea;
- Survey and certification of all ships flying its flag;
- Ensuring that foreign ships calling its ports are safe to proceed to sea (PSC); and
- Maritime transport and shipping activities.

It is not the intention of the author to discuss the detailed historical development of ship registration at this juncture, however, what must be mentioned here is that the Eritrean law regarding registration of ships, namely the "Registration of ships proclamation No. 77/1995" is a very closed registry regime. Thus, in respect of the competitive world, particularly in the coming of the new millennium of the 21st century towards globalisation, most countries, even the developed ones, are leading to a half way open registry regime from a very tight closed ship registry system. Hence, it is the view of the author that in Eritrea the open ship registry system be adopted by introducing, at least, the minimum requirements of safety standards and clear guidelines and regulations, so that this may be beneficial in terms of employment creation and revenue generation.

It is clear that the Maritime Administration, called the Department of Maritime Transport (DMT), plays a major role in the prevention of pollution from ships, primarily, because DMT is the lead liaison between the Ministry/Government and the International Maritime Organisation (IMO) regarding ship source pollution and other IMO Conventions, particularly MARPOL 73/78. In this respect, to avoid over lapping with other departments of the government, it is, thus, recommended to clearly define the responsibility and jurisdiction as to who will be the lead to respond to marine pollution.

Although the organisation of the Department of Maritime Transport has been structured well to fulfil its objectives of maritime safety and environmental protection, and the development of the maritime transport industry, it lacks the prerequisite of the necessary skilled personnel to perform its duties as required.

Due to the lack of skilled personnel in the maritime field, the DMT is hampered to discharge its responsibility in protecting the marine environment. As a result, this

has greatly compromised the protection of the marine environment and the safety of ships at sea.

Nevertheless, recognising the lack of skilled manpower, the Ministry of Transport and Communications (MTC) sent five of its employees in 1998 and one in 1999 for higher education, one of which is the author, to the World Maritime University (WMU) which is a unique maritime university established by IMO in Malmö, Sweden. In addition, the MTC sent other employees from the ports administration for short and long-term training programmes to other maritime institutes. On the other hand, in order to modernise the Department of Maritime Transport (DMT) and draft its Maritime Legislation, the government of Eritrea /MTC had requested technical advice from IMO. In reply to its request, IMO sent two consultants in March,1998, for this purpose and the process is in pipeline. The DMT has also drafted 'The Eritrean Ports Regulation' which is awaiting for adoption. This port regulation will also play a great role in preventing and controlling marine pollution and the safety of ships, especially in implementing MARPOL 73/78. Therefore, in the very near future, the author believes that the DMT will be able to discharge its national and international responsibilities in protecting the marine environment and safeguarding the safety of ships.

3.2 The Role of the Department of Environment

The responsible agency for the Eritrean Environment was the "Eritrean Agency for the Environment" (EAE). The aim for the establishment of EAE is primarily to co-ordinate for the protection and enhancement of Eritrea's environment in order to achieve a rapid social and economic development.

The main functions of EAE are:

- "Environmental research, environmental monitoring, environmental impact assessment and environmental auditing;
- Environmental law, licensing law, standard setting and enforcement, through the 'polluter pays' principle;
- Environmental awareness, education and training; and
- National parks, reserves and protected areas."(Government of Eritrea,1995)

However, after the restructuring of the governmental institutions, the EAE was replaced by the Department of Environment under the umbrella of the Ministry of Environment, Land and Water. In 1996, the Eritrean environmental proclamation was drafted but has not yet been enacted. Under this draft document it proposed the establishment of institutions to implement the nation's environmental objectives and policies including the Eritrean agency for the environment (now it is called the Department of the Environment) as the lead agency. The draft document also requires the Eritrean agency for the environment to develop regulations for the management of environmental quality and natural resources, such as water and air quality standards, waste management standards, etc

In 1998, a national environmental assessment procedures and guidelines has been prepared by the Department of the Environment. It deals with procedures and guidelines for environmental clearance of projects and for monitoring and evaluation of projects. The task of environmental impact assessment is assigned to this department. It has also co-ordinated and prepared a "National Biodiversity Strategy and action Plan" for Eritrea.

At present the Department of Environment seems to be the national lead agency, though the environmental legislation has not been enacted

3.3 The Role of the Ministry of Fisheries

Marine environmental degradation often results from short-term economic considerations, at great long-term cost. Degraded fisheries mean lower catches and lower revenue. Increased demand for fish has led to the over-exploitation coastal fisheries. Therefore, to protect and preserve the sustainability of the marine resources depends on the expanded public environmental awareness and integrated, sustainable management based on scientific information. Thus, this requires clear communication and sharing of information among different sectors of the government including the private and non-governmental organisations, the neighbouring coastal states, scientists and the general public are the most important.

Furthermore, successful coastal management requires integrated, collaborative action by national and regional agencies, the participation of local citizens and

industry, and even agreements between nations. However, this is neither a simple nor an easy task; but the resolution to this issue i.e. the harmonisation, integration and co-operation among the industry and the government depends primarily on the determination and political will to implement it.

The government of Eritrea, recognising the importance and the economic contribution of fishery resources to the national economy, established at the Ministerial level (the then Ministry of Marine Resources and now the Ministry of Fishery), which previously during the Ethiopian regime was at a department level under the Ministry of Agriculture, to manage, develop and ensure the sustainability of the marine resource. As a result, the then Ministry of Marine Resources, to discharge its responsibilities and achieve its objectives organised a "Marine Environmental Protection Conference held in Massawa, 13-16th October 1994.

The objectives of this Conference are:

1. To formulate a set of interim regulations governing interventions in the marine environment in co-ordination with all the associated Ministries and non governmental organisations, including particularly the Department of Maritime Transport, Ministry of defence- the Eritrean Navy, Ministry of Trade Industry, Ministry of Construction, Ministry of Agriculture, Ministry of Tourism, Oil companies, and other related agencies;
2. To formulate an oil spill contingency plan in the event of an oil spill or other man -made disaster in Eritrean waters;
3. To establish a reserve fund for financing marine environmental activities, including enforcement, emergency activities, communication and education;
4. To establish an integrated administrative unit and mechanism to manage activities related to the marine environment;
5. To increase awareness in Eritrea in protecting the marine environment.

The most important issue discussed at the conference was the intervention of the different sectors of the government in the use of the marine resources without a clear jurisdiction or control. The then Minister of the Ministry of Marine Resources underlined that: "It is true that each government authority has attempted to have the

extant regulations put into effect, but in many cases those existing regulations are inadequate, and in some non-existent. This situation has led to a confusing, contradictory and redundant set of laws. But the most serious of all were those activities deemed harmful to the marine habitat, and which did not fall under any jurisdiction or control." (MMR, 1994)

Furthermore, the Minister went on emphasise the need for harmonisation and co-ordination of the different government agencies and argued that such a state of affairs should not be allowed to continue. Thus, seven government agencies met and established a committee to address the following major concerns:

- "To co-ordinate and harmonise all existing regulations proposed or adopted by each government agency in its area of competence, resulting in coherent, transparent and relevant guidelines, encompassing all major marine activities;
- The integration of all immediate and future plans for development, and assess their proposed impact on the marine fauna and flora of the coastline and the open sea;
- Establish a common monitoring and data process centre, that would serve government and non-government agencies as a source of reliable information, and will co-ordinate the relevant activities of each;
- To convene a conference of the involved agencies, experts from home and abroad, and the public at large, which jointly will synthesis theses findings and formulate coherent regulations that would reflect Eritrea's obligations to its people and adhere to all relevant international conventions;
- Establish, if deemed necessary, a mechanism that will follow the recommendations and initiate a plan of action." (MMR, 1994)

As a result of this conference, the Ministry of Fisheries (the then MMR) drafted an Integrated Marine and Coastal Management Proclamation in 1995. The draft proclamation contains: Management of the coastal zone; environmental effects of projects; pollution from land; pollution from offshore sources; environmental hazardous activities; protection of the coastal environment; enhancement of the

coastal environment; control of human activities; and offences and penalties; and general provisions.

This is a step forward in establishing a coastal zone management process. However, it is very important to integrate this proclamation into the national environmental proclamation. On the other hand, also to be taken into consideration is the proposal of the Integrated Coastal Zone Management prepared by the Eritrean Agency for the Environment in 1995, namely, "National Environmental Management Plan for Eritrea, 1995." In addition, the Sensitivity Mapping issue in Eritrean waters should also be conducted in co-ordination with other concerned departments.

Therefore, the Ministry of Fisheries, in order to play its role in protecting the marine environment in general and to protect and preserve the sustainability of the marine resources, in particular, an integrated and multi-sectoral approach is essential.

3.4 The Role of the Ministry of Tourism

The marine environment is the main natural resources on which coastal tourism depends. The development of the tourist infrastructure along the coastal areas and islands has an adverse effect on the marine environment. The Ministry of Tourism should therefore integrate tourism development with the National Environmental Impact Assessment Procedures.

The Ministry of Tourism, however, recognising the interdependence of the marine environment and coastal tourism has planned to introduce environmentally sensitive tourism development in order to protect and preserve the environment (terrestrial and marine). "Taking all aspects of tourism development into consideration, we have to aim at an environmentally sensitive development of tourism. This objective can be achieved by planning a tourism strategy following conservation and rehabilitation ethics for our environment - marine or otherwise." (MMR, 1994)

3.5 The Role of the Ministry of Energy and Mines

The Ministry is responsible for the exploration of oil, gas and geothermal by petroleum companies to ensure that they comply with the requirements of

environmental standards. In other words, environmental impact assessment should be undertaken before exploration takes place and remedial measures in the case of an accident or incident with the stipulated regulations in the agreement.

The electric power plants, gas and oil exploration and mining and mineral processing activities, particularly along the coastal areas, are associated with a variety of environmental impacts. Thus, recognising the adverse effect on the environment, the government has adopted petroleum and mining regulations to comply with and to protect and minimise damage to the environment. The Eritrean regulation on petroleum operations No. 24/1995 gives provisions on the 'environmental and, pollution control and safety measures' in article 11.

3.6 The Role of the Eritrean Navy

The Eritrean Navy is at an early stage of development in respect of trained manpower and the required equipment and facilities. However, the Eritrean Navy (Eritrean Coast Guard) plays a great role in protecting and preserving peace and security in the Eritrean territorial waters, in particular and in the Red Sea Region in general. In addition to this national responsibility, the Eritrean Navy shoulders the responsibility of protecting the marine resources and its environment. It may be responsible for marine pollution response, maritime search and rescue, fisheries protection and intervention interdiction in Eritrean waters. Hence, the Eritrean Navy plays a great role in safeguarding and protecting the Eritrean territorial waters against unlicensed poachers of fish and the illegal discharge of waste from vessels. It also controls the illegal movement of vessels from the prescribed shipping lanes.

In this regard, the Eritrean Navy is aware of the pollution of the marine environment. This was demonstrated in the Conference held in Massawa from 13-16 October 1994 on the 'Protection of the Eritrean Marine Environment'. "It is evident that sovereignty is where the coastal state exercises sovereign rights. In Eritrea's case there is a 12 nautical mile territorial sea limit. It is also understood, that sovereignty is essential to statehood, security and development. Statehood is the condition of being an independent nation, while sovereignty is the quality of being an independent self-governing country. Security is protection against law-breaking in

such cases as pollution, fishing, enemy infiltration, resources, etc. What is more, since Eritrea is sovereign and secure, it can use the resources for development. Eritrea's interests must be protected and safeguarded, taking into consideration the interests of the international community." (MMR, 1994)

Therefore, to ensure that the Eritrean marine environment is protected and preserved, it requires the integration and co-operation of the different governmental departments, including private industries/sectors.

3.7 The Role of the Ministry of Trade and Industry

The development of various industries in the coastal areas have an impact on the marine environment. At present, although there are not many industries established along the coast, there is a trend of an increasing demand for the establishment of industries in the coastal areas. However, economic development should not be at the expense of the marine environment. Environmental Impact Assessment (EIA) should be made before any developmental investments. The industries already established, particularly the cement and salt factories have an effect on the marine environment. Much of the pollution results from the dust of the cement factory and sewage. Therefore, a regulatory system and treatment should be required to prevent pollution.

3.8 The Role of the Ministry of Agriculture

Agriculture along the coastal areas of Eritrea is not yet developed. Most of the agricultural activities are done in the highlands. One of the threats to the marine environment is the introduction of inorganic chemicals used as fertilisers and pesticides on the farmland entering into the sea through agricultural run-off. This is discussed in Chapter two.

At present there is an increasing demand for agricultural investment projects in the coastal areas. As a result, the introduction of fertilisers in these areas will be a threat to the marine environment. Therefore, the Ministry of Agriculture should take this problem into consideration in respect of the risk to the marine environment.

3.9 The Role of the Ministry of Education

The marine environment issues were not of great concern in the past but nowadays it is getting a great attention from the public. As a result it is very important to incorporate the national environmental issues and concerns in school curricula and higher educational institutes.

The Ministry of Education has already initiated the first steps in this direction. At present the University of Asmara has introduced the Law of the Sea Course in the Law programme.

3.10 The Role of the Ministry of Information

Eritrea suffers from a general lack of awareness about environmental issues and consequently there is little emphasis placed on the protection of the marine environment by the general public. Hence, there is great need to create environmental awareness in the public. Here the Ministry of Information plays a great role.

A programme in environmental awareness addresses all levels of society and should strive to reach people of different ages, genders, economic and social standings as well as reach inhabitants in all geographic regions of the country.

3.11 The Role of the Local Municipalities (Authorities)

The local municipalities play a major role in creating public awareness and implementing environmental policy. Eritrea has two major port cities, namely Massawa and Assab. There are also other small towns along the coast. Although the coastline of Eritrea is about 1200 km, is second to Saudi Arabia in the Red Sea. The coastal area is sparsely populated. Hence the major threat to the marine environment is caused by sewage and water run-off in the two port cities. Eritrea has about 350 islands, one of which is the Dahlak island. Here also care should be taken to prevent pollution from tourist activities. “There are almost no regulations governing human interventions in the marine environment surrounding the city, part from customary laws loosely governing the disposal of waste, mainly garbage and sewage.” (MMR, 1994)

This problem is aggravated by the lack of public reception facilities for garbage disposal. Therefore, the local municipalities should prepare adequate reception facilities and thereby regulatory instruments to alleviate the problem are needed. Therefore, there is a need for regulatory instruments and enforcing institutions to alleviate this problem.

3.12 The Role of the Oil Companies

The oil companies operating in Eritrea should take measures in preventing spillage and other incidents of oil spillage from transportation and operations (discharging and loading). The oil companies are required to have an oil spill contingency plan and the necessary equipment and trained personnel to combat an oil spill in case of an incident. This contingency plan also needs to be co-ordinated with the local and National Oil Spill Contingency Plan. The company should co-operate in combating oil spills in case of emergency.

3.13 The Role of Environmental Non-Governmental Organisations

A large number of Environmental Non-Governmental Organisations (ENGOs) have played a vital role in environmental protection by interacting with governmental organisations, industries and individuals. These organisations can play a very important role in creating awareness in the general public by advocating and disseminating information about environmental damage and threats.

Some ENGOs monitor environmental quality and use that information in their publicity, but this is for the environment as a whole rather than individual sources of pollution. Typically that monitoring is based on raw data produced by others. Some ENGOs play significant roles in monitoring particular issues, in this case the marine environment, and setting the agenda, for example the role of the United Nations Environmental Programme (UNEP) initiated a Regional Seas Programme in 1974. At present this includes ten regions and has over 120 coastal states participating in it. It plays a great role in protecting and preserving the marine resources and the environment; for example, the Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment, (PERSGA, 1982), which Eritrea is not yet a

party to, and in addition, the role of the International Union for Conservation of Nature (IUCN) at the international level in setting the agenda for international wild life agreements, especially the convention on International Trade in Endangered Species (CITES).

> The *World Conservation Strategy*, published by IUCN in 1980, was one of the first to emphasise that conservation is not the opposite of development. The Strategy emphasised that conservation, including both protection and the rational use of natural resources, is essential if people are to achieve a life of dignity, and if the welfare of present and future generations is to be assured. It drew attention to the almost limitless capacity of people both to build and destroy. It called for globally co-ordinated efforts to increase human well being and halt the destruction of the Earth's capacity to support life. The strategy stated that sustainable development depends on caring for the Earth. Unless fertility and productivity of the planet are safeguarded, the future of mankind is at risk. The World Conservation Strategy emphasised three objectives: Essential ecological processes and life-support systems must be maintained; genetic diversity must be preserved; and any use of species or ecosystem must be sustainable." (O'Sullivan J, 1996)

CHAPTER FOUR

4. NATIONAL AND INTERNATIONAL MARINE ENVIRONMENT LEGAL FRAMEWORK

4.1 National Environmental Legal Framework

The damage caused by human intervention on the marine environment and ecosystem has become of great concern. The exploitation of the marine resources, economic development on the coastal areas, the increasing maritime (ports and shipping) activities and the increasing flow of people to these areas posed a great risk to the Eritrean marine resources and the environment. Therefore, to protect and prevent the risks sound environmental policies and an enforcement regime of national and international legal instruments are required.

This chapter describes the national environmental policies, legislation and the international maritime conventions and agreements.

4.1.1 National Environmental Legislation

The legal framework dealing with the marine environment is formed by the national legislation and international conventions and agreements. It was not until recently that governments saw the need for a link between developmental activities and the need for an environmental regulatory mechanism. In fact the first proper environmental legislation came in the late 1980s. All sectoral environmental laws are part and parcel of the National Environmental Law.

The devastating consequences of uncontrolled environmental change create a great concern to the public. This then requires effective remedial action on a national and international level.

To date in Eritrea, few regulations have been enacted for environmental protection purposes. However, the government has placed high priority on the

drafting and adoption of an environmental legislation framework that has now been finalised and is awaiting adoption.

The Eritrean Environment proclamation (draft dated 1996) is a proposed environmental law which:

- Defines national environmental objectives and policies;
- Defines principles of environmental protection and sustainable development;
- Establishes institutions to implement the nation's environmental objectives and policies, including the Eritrean Agency for the Environment as the lead agency;
- Defines basic instruments of environmental protection and sustainable development, including environmental impact assessments and environmental impact statements;
- Requires the Eritrean Agency for the environment to develop regulations for management of environmental quality and natural resources, such as water and air quality standards, waste management standards, etc.; and
- Proposes the development of an Eritrean Monitoring and Assessment Network to monitor environmental quality, conduct inspections and audits, collect and analyse samples, and compile and synthesise environmental data.

4.1.2 National Environmental Assessment Procedures

Environmental Impact Assessment (EIA) has been a significant development in environmental management. Consequently, legislation and administrative regulation on EIA are being adopted in many countries partly due to the pressure from funding agencies which require such as part of the appraisal of development project and partly due to the increasing environmental awareness of the general public.

Environmental Impact Assessment procedures are designed to identify environmental problems which may be caused by a development project and determine the magnitude of the change in the environment. Through this process design, location and operational changes can be introduced to minimise the adverse impacts of the development. EIA is a process having the ultimate objective of providing decision-makers with an indication of the likely consequences of their actions.

The Ministry of Land, Water and Environment, Department of Environment, has drafted a 'National Environmental Assessment Procedures and Guidelines' dated May, 1998 and is awaiting for its adoption. Hence, any developmental projects in Eritrea are required to prepare an EIA. For instance, petroleum exploration is required to prepare an EIA in accordance with Eritrea's "regulations on petroleum operations" No. 24/1995 issued by the Ministry of Energy and mines pursuant to the powers vested in it under article 7(1) of the petroleum operations proclamation number No. 40/1993. This petroleum operation proclamation addresses provisions, inter alia, defines blocks for petroleum leasing, lists information requirements for companies applying to conduct petroleum operations, and specifies drilling practices and environmental pollution control, and safety measures. In addition, Part V, sub - article 11(5) requires the contractor to conduct one or more Environmental Impact Studies. Furthermore, the company is also required to prepare an oil spill contingency plan.

The National Environmental Assessment Procedures & Guidelines (NEAP&G) encompasses procedures and guidelines for the environmental clearance of projects and their maintenance and evaluation. The objectives of the National Environmental Assessment Procedures are:

- To promote economic development without any unnecessary decline in environmental quality, thus ensuring that both economic development and the environment in Eritrea are sustainable in the long term;
- To assess the significance of potential impacts which the implementation of a project may have on the environment;
- To reduce delays in project approval procedures by providing a standardised and transparent system for environmental assessment; and
- To improve project design and performance, thus improving overall economic efficiency.

The implementation of the procedures for environmental clearance will be the responsibility of the Department of the Environment; Ministry of Land, Water and

Environment, in collaboration with other designated competent authorities within the central and regional administration of the Government.

4.1.3 National Environmental Management Plan

The National Environmental Management Plan for Eritrea (NEMP -E) was prepared by the government of Eritrea in 1995. The NEMP-E is: "The blue print for co-ordinating the protection and enhancement of Eritrea's natural resources, so that optimal social and economic development can be achieved in consonance with the rational and sustainable use of these resources, for current, as well as future, generations."(Government of Eritrea, 1995)

The NEMP-E comprises four parts. These can be summarised as follows:

- Part A gives an overview of the environmental and developmental prospects for Eritrea within an international and national context;
- Part B addresses the major environmental and developmental issues confronting Eritrea;
- Part C defines major steps and responses involved in an integrated environmental and developmental planning process, proposes a program strategy and structure for the NEMP-E and identifies key programme activities; and
- Part D examines in detail the requirements for implementation of the NEMP-E and its associated project activities, institutional prerequisites, and financial and human resources.

A fundamental principle of the NEMP-E is that environmental priorities should be identified through a consultative process. In other words, priorities should reflect a consensus by the people, the government and experts and academia. Based on this principle, the technical committee, which was responsible for the substantive drafts of the plan, consulted a large sample population and institutions from different regions of Eritrea.

NEMP-E provides the overall context for Eritrea's ongoing efforts to develop and implement a comprehensive set of environmental policies and programmes. It contains provisions regarding the coastal and the marine environment and describes briefly the threats posed to the marine resources and the environment.

4.1.4 National Maritime Legislation

The tendency towards uniformity is one of the characteristic features of maritime law, and therefore the legislative work is mostly the incorporation of the international conventions and regulations into the national legal system of a state. It must be understood that the effectiveness of any international instruments by and large depends on modern maritime legislation and the enforcement by the contracting party. The contracting party should be able to enforce the provisions of IMO Conventions and other international instruments to fulfil its national and international responsibilities and work for the realisation of safer ships and cleaner oceans.

The main purpose of maritime law is to implement the basic objectives of a state, in this case Eritrea, as a coastal state, port state and flag state. These objectives are, inter alia, to prevent pollution from ships, to prevent accidents from ships, and safety of navigation. To achieve these objectives establishment of an effective legal regime is a necessity.

According to IMO, 1993 maritime law has public and private aspects:

> Public Maritime law concerns matters related to the distribution and exercise of power by public authorities and the legal relations between the State (and its administration) and the individuals. Public law provisions (example administrative law, criminal law) are aimed at the protection of public and common interests. Maritime law rules that are of public law character regulate, inter alia, the registration of vessels, most aspects of the safety of ships and safety of navigation, control of shipping operations, the movement of persons and goods in port, casualty investigations and some aspects of preservation and protection of the marine environment.
>
> In contrast, private maritime law is concerned with the legal relationships between individuals such as corporations, companies, etc., and its primary purpose is the protection of individual interests. With in the ambit of private law falls, inter alia, civil law as well as commercial law. It means that, for instance, all property and contractual relationships in maritime shipping and related activities.

Eritrea, after 30 years of a devastating war has emerged as a newly independent nation since 1993. As a result, Eritrea has not gone far coupled with the critical lack

of expertise in this field to formulate an effective national maritime law of its own. Hence, temporarily it adopted the outdated maritime law of Ethiopia enacted in 1960 with some modifications and amendments. It should be noted that many International Conventions and protocols have been adopted and amended since1960. In this regard, it is of crucial importance and timely that Eritrea takes action to formulate an effective and modern maritime law of its own. However, as discussed before, it has requested technical advice from IMO to draft its maritime legislation as well as modernisation of its Maritime Safety Administration. As a result, IMO sent two consultants to Eritrea from 29 March to 12 April 1998 for this purpose; and this is still in the pipeline.

4.2 International Maritime Legal Instruments

Eritrea is a signatory member of IMO as of May 9, 1995. It has ratified the following conventions:

- International Convention for Safety of Life at Sea, 1974 (SOLAS 1974)
  (ratification does not extend to the 1978 and 1988 protocols)
- International Convention on Standards of Training, Certification and Watch keeping for seafarers, 1978 (STCW, 1978)
  (ratification does not include that of STCW 1995)
- International Conventions on Tonnage Measurement of Ships 1969 (TONNAGE, 1969)
- Convention on the International regulations for prevention collisions at Sea, 1972 (COLREG, 1972)
- International Convention on Load Lines 1996 (LL,1966)
  (ratification does not include the 1988 protocol)

It is clear that most of the international conventions, inter alia, the MARPOL 73/78 and UNCLOS, 1982 that are of great importance in the prevention of marine pollution are not yet ratified by Eritrea.

Thus, it is necessary to ratify the relevant international conventions on marine pollution and incorporate them into the national law of Eritrea. The international conventions that are related to marine pollution are examined below.

4.2.1 The International Convention for the Prevention of Pollution from Ships, (MARPOL, 73/78)

The most important international Convention relevant to marine pollution in the Red Sea is the International Convention for the Prevention of Pollution from Ships (MARPOL, 73/78). The initial 1973 agreements were modified by the protocol of 1978, which is referred to as MARPOL 73/78.

MARPOL 73/78 establishes the rights and obligations of enforcement applicable to any State party to the Convention as a flag State, port or coastal State, subject to relevant safeguards.

In order to enforce the provisions of MARPOL 73/78 a State party must give full effect to the provisions of the Convention under national law. This includes the passing of enabling regulations in respect of all the technical Annexes to which the State is bound, and the incorporation of a framework of sanctions against violations within the jurisdiction of a State party.

MARPOL 73/78 obliges “all flag, coastal and Port State parties that any violation of the requirements of the present convention within the jurisdiction of any party to the convention shall be prohibited and sanctions shall be established, therefore, under the law of the party.”

The primary basis for the regulation of ships is the jurisdiction enjoyed by the flag state. International law requires a flag state to exercise effective jurisdiction and control over the ship in administrative, technical and social matters, including taking measures to prevent pollution.

The flag state must ensure that the ships entitled to fly its flag meet those standards adopted by the state, which are to be, as a minimum, in conformance with international standards (among others MARPOL 73/78).

Both UNCLOS and MARPOL 73/78 obligate contracting parties to enforce laws and regulations relating to the prevention, reduction and control of pollution of the marine environment from vessels flying their flag and from foreign vessels operating within their jurisdiction.

Article 1(1) of MARPOL 73/78 requires all state parties to:

> Undertake to give effect to the provisions of the present convention and those Annexes thereto by which they are bound, in order to prevent the pollution of the marine environment by the discharge of harmful substances or effluents containing such substances in contravention of the convention. In accordance with this obligation a state party to MARPOL will need to implement a range of monitoring, compliance and enforcement mechanisms to give force and effect to the convention. Compliance with the convention should primarily focus on preventing pollution, and not simply on apprehending and punishing violators.

It is important that legislation or regulations implementing MARPOL 73/78 establish the elements of a MARPOL 73/78 violation such that enforcement personnel or courts are able to ascertain whether clear objective evidence of a violation is present. Some states require in every case evidence in the form of chemical analysis, such as 'oil finger printing', that proves that the discharge came from a particular ship and no other possible source. This means that other relevant evidence of illegal discharge, such as eye witness statements, Oil Record Book entries, and so on, is rendered most. Such an evidentiary requirement on enforcement is unduly burdensome and significantly reduces the ability of the state to enforce the provisions of MARPOL 73/78 effectively. As such the gathering, presentation and admitting of evidence for MARPOL 73/78 violations must be carefully developed by States, for the effective enforcement of the convention." (MEPC 42/13)

Article 4 of the MARPOL Convention states that "Any violation of the present Convention shall be prohibited and sanctions established therefore under the law of the Administration of the ship concerned wherever the violation occurs." MARPOL 73/78 further provides that sanctions should be "adequate in severity to discourage violations and shall be equally sever irrespective of where the violations occurred."

MARPOL 73/78 covers all the technical aspects of pollution from ships, except the disposal of waste into the sea by dumping, and applies to ships of all types, although it does not apply to pollution arising out of the exploration and exploitation of sea-bed mineral resources.

Under MARPOL 73/78, flag states must inspect their vessels and issue an international oil certificate. It combines discharge regulations with the mandated adoption of equipment and operational procedures. The convention operates with two levels of standards to be fulfilled, one for general areas and the second for special areas. In general areas, discharge criteria are specified for oil, noxious liquid substances, sewage, and solid waste. In special areas, even limited discharges are prohibited.

Eritrea has not ratified the MARPOL 73/78 Convention, to date but it has stated its interest and commitment in doing so. Furthermore, the main reason for not ratifying this convention is the lack of finance to fulfil the required reception facilities and lack of trained personnel. Before ratifying any Convention and incorporating it into its national law, an administration needs to consider its implications for its shipping industry (i.e. the cost to its ship owners); its ports (i.e. the provisions of reception facilities for oil, chemicals, sewage and garbage); and its environment (how to deal with domestic ships). In this respect, only ratifying a convention without having the required material and resource to implement the convention becomes meaningless. However, efforts should be made to fulfil the requirements in order to prevent ship source pollution. Unless Eritrea ratifies the convention and incorporates it into its national law it cannot enforce the convention against others that are parties to the convention. The implementation of an international convention for Eritrea is therefore, an essential step without which it cannot benefit in so far that the application of that law within its jurisdiction is concerned.

4.2.2 The United Nations Convention on the Law of the Sea, (UNCLOS, 1982)

As in MARPOL 73/78 UNCLOS also obligates contracting parties to enforce laws and regulations relating to the prevention and control of pollution of the marine environment from vessels flying their flag and from foreign vessels operating within their jurisdiction.

The UNCLOS is that law which states, coastal and landlocked, and/or international organisations regulate their relations in respect of those areas subject to

coastal state jurisdiction and in relation to those areas of the sea-bed beyond national jurisdiction. Customary international law sets provisions regarding vessel source pollution. Some of the most relevant provisions of the marine environmental pollution in the convention are discussed below.

Article 21of the UNCLOS addresses laws and regulations of the coastal state relating to innocent passage. It states that "a coastal state may adopt laws and regulations, in conformity with the provisions of this convention and other rules of international law, relating to innocent passage of vessels through the territorial sea, in respect to the preservation of the environment of the coastal state and the preservation, reduction and control of pollution, the prevention of infringement of the customs, fiscal, immigration or sanitary laws and regulations of the coastal state, the conservation of the living resources of the sea and the safety of navigation and the regulation of maritime traffic."

Article 39 of the UNCLOS provides the duties of ships during transit passage. It states that when ships exercise the right of transit passage they shall comply with generally accepted international regulations, procedures and practices for the prevention, reduction and control of pollution from ships.

Furthermore, Article 42 of this Convention sets forth laws and regulations of states bordering straits relating to transit passage. It says that "states bordering straits may adopt laws and regulations relating to transit passage through straits, in respect of the safety of navigation and the regulation of maritime traffic and the prevention, reduction and control of pollution, by giving effect to applicable international regulations regarding the discharge of oil, oily wastes and other noxious substances in the strait."

Article 43 sets provisions on the navigational and safety aids and other improvements and the prevention, reduction and control of pollution. It states, user states and states bordering a strait should by agreement co-operate in the establishment and maintenance in a strait of necessary navigational and safety aids or other improvements in aid of international navigation; and for the prevention, reduction and control of pollution from ships.

Part XII of UNCLOS sets provisions for all states to protect and preserve the marine environment. Furthermore, this part under sections 4 and 5 addresses monitoring and environmental assessment; and international rules and international legislation to prevent, reduce and control pollution of the marine environment respectively. Under section 4 of part XII article 204 states that "states shall, consistent with the rights of other states, endeavour, as far as practicable, directly or through the competent international organisations, to observe, measure, evaluate and analyse by recognised scientific methods, the risks or effects of pollution of the marine environment. In particular, states shall keep under surveillance the effects of any activities which they permit or in which they engage in order to determine whether these activities are likely to pollute the marine environment."

Under section 5 of part XII, article 207 sets provision of pollution from land-based sources. This article addresses that states shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment from the land-based sources, including rivers estuaries, pipelines and out fall structures, taking into account internationally agreed rules, standards and recommended practices and procedures.

Article 211 sets provisions regarding pollution from vessels and expresses states to act through the competent international maritime organisation to establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels and promote the adoption of routing systems designed to minimise the threat of accidents which might cause pollution of the marine environment. It further states that states are required to adopt laws and regulations for the prevention, reduction and control of the marine environment from vessels flying their flag.

Eritrea has not yet ratified UNCLOS 1982. Since Eritrea is located in the Red Sea which is designated as a Special Area due to its oceanographic and ecological factors, it is important that Eritrea ratify this convention. Furthermore, UNCLOS provides a general legal framework for dealing with the prevention of marine

environmental pollution. Therefore, it is necessary to adopt and incorporate its relevant provisions in its national laws.

4.2.3 The International Convention on Oil Pollution Preparedness, Response and Co-operation, (OPRC, 1990)

The purpose of this convention is to provide a global framework for international co-operation in combating major incidents or threats of marine pollution. Parties to this convention are required to establish measures for dealing with pollution incidents, either nationally or in co-operation with other countries. Furthermore, under this convention ships are required to carry a ship board oil pollution emergency plan. In addition, the most important provision of this convention is that parties operating on offshore under their jurisdiction are required to have oil pollution emergency plans or similar arrangements which must be co-ordinated with national systems for responding promptly and effectively to oil pollution incidents. The convention went on to emphasise that ships are required to report incidents of pollution to coastal authorities and it further calls for the establishment of stockpiles of oil spill combating equipment, the holding of oil spill combating exercises and the development of detailed plans for dealing with pollution incidents. Finally, the convention addresses the requirements of parties to provide assistance to others in the event of pollution emergency and provision is made for the reimbursement of any assistance provided.

The OPRC Convention, which is the most important for the preservation of the marine resources and control of marine pollution has not yet ratified by Eritrea. In addition, Eritrea is not a member of the Regional Convention for the Conservation of the Red Sea and the Gulf of Aden Environment, 1982 and its protocol for regional co-operation in combating pollution by oil and other harmful substances in case of emergency. “The Red Sea and Gulf of Aden Environment Programme was initiated by the Arab League Educational, Cultural and Scientific Organisation (ALECSO) following the preparatory meeting organised by UNESCO at the request of ALECSO and held at Bremerhaven, Federal Republic of Germany, 22-23 October 1974 which

included, together with UNESCO, experts from specialised institutes in the Federal Republic of Germany, USA, UK, France, Saudi Arabia and Egypt."(UNEP, 1986)

However, it is imperative that Eritrea be a party to the OPRC, 1990 Convention and the Red Sea Regional Convention in order to prepare, respond and co-operate in the case of oil pollution incidents.

4.2.4 The International Convention on the Prevention of Marine Pollution by Dumping of wastes and other matters (LC, 1972)

This convention which was adopted in 1972 and entered into force in 1975 is, also known as the London Convention. The convention has a global character, and contributes to the international control and prevention of marine pollution. It requires prior permission and the prohibition of dumping of certain hazardous materials and other wastes into the sea.

Dumping has been defined as "the deliberate disposal at sea of wastes or other matter from vessels, air craft, platforms or other man-made structures, as well as the deliberate disposal of these vessels or platforms themselves." (IMO, 1999)

The convention states that waste derived from the exploration and exploitation of sea-bed mineral resources is, however, excluded from the definition. Furthermore, the provision of the convention does not apply when it is necessary to secure the safety of human life or of vessels in cases of force majeure.

The convention requires the parties to designate an authority to deal with permits, records, and monitor the condition of the sea. It also gives provisions designed to promote regional co-operation, particularly in the fields of monitoring and scientific research. Furthermore, it provides annexes that lists wastes which can not be dumped and others for which a special dumping permit required. The criteria governing the issuing of these permits are laid down in the annexes which deal with the nature of the waste material, the characteristics of the dumping site and methods of disposal.

Since the adoption of this convention a series of amendments and protocol have been made, for instance, the 1996 protocol (intended to replace this 1972 Convention) was adopted in November 1996 and entered into force 30 days after ratification by 26 countries, 15 of whom must be contracting parties to the 1972

treaty. It represents a major change of approach to the question of how to regulate the use of the sea as a depository for waste materials. One of the most important innovations is to introduce in article 3 of the protocol namely the precautionary approach. This approach requires an appropriate preventive measures to be taken when there is reason to believe that wastes or other matter introduced into the marine environment are likely to cause harm even when there is no conclusive evidence to prove a casual relation between inputs and their effects.

Comparing the 1972 convention and the 1996 protocol there is a great difference in the dumping of waste materials into the sea. For example, the 1972 convention permits dumping to be carried out provided certain conditions are met. While the protocol is much more restrictive. Article 4 of this protocol provides contracting parties to prohibit the dumping of any wastes or other matter with the exceptions of those listed in Annex I. While article 8 addresses the situation when dumping is to be carried out. This is mainly in case of force majeure caused by stress of weather, or in case of danger to human life or a real threat to the vessel.

The UNCLOS 1982 addresses relevant provisions to pollution by dumping. These are articles 210 and 216 of UNCLOS. Article 210 provides coastal states the right to adopt laws and regulations to prevent and control pollution of the marine environment by dumping. It further states that “such laws, regulations and measures shall ensure that dumping is not carried out without the provision of the competent authorities of States.” While article 216 addresses “enforcement with respect to pollution by dumping.”

Eritrea has not ratified this convention to date. In spite of the short period of independence of Eritrea and the lack of experts in this field, the government of Eritrea is committed to preserving the marine environment. A reflection of this commitment is that the government prepared a national environmental management plan just after three years of independence. It is a blue print for co-ordinating the protection and enhancement of Eritrea’s natural resources.

However, the management and the use of the marine environment, especially in the treatment and awareness of the hazardous chemicals, is very low.

> Little is known in Eritrea about the use and accumulation in the environment of chemicals, including toxic chemicals. At present there is no legislation or control on import, registration, transportation, storage, sale, use or disposal of pesticides and other toxic or hazardous chemicals, except for the issuing of import permits by the appropriate authorities. The government intends to undertake a study in this area and to prepare appropriate legislation and management procedures. Equally important is the elaboration and dissemination of detailed guidelines and manuals for the control of potentially hazardous chemicals, acids and thinners used by industry or households. (Government of Eritrea, 1995)

Hence, ratifying this convention is important for a country like Eritrea to reduce and control the pollution of the marine environment from the illegal dumping of wastes and other matters into the sea.

4.2.5 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, (Basel Convention, 1989)

The 1989 Basel Convention has indirect implications for the shipping industry. This Convention entered into effect on 5 May 1992; and it is under the jurisdiction of the UNEP. It provides measures to prevent hazardous wastes that are generated in one country to be transported often from highly regulatory systems to less regulated regions. The Convention basically forbids the transboundary movement of such substances and directs signatory States to dispose of such materials within their own territory.

Article 14(1) of the Basel Convention stipulates: “The parties agree that, according to specific needs of different regions and sub-regions, regional or sub-regional centres for training and technology transfers regarding the management of hazardous wastes and other wastes and the minimisation of their generation should be established. The parties shall decide on the establishment of appropriate funding mechanisms of a voluntary nature.”

In Eritrea, the risk of damage to human health and the environment caused by hazardous wastes (particularly toxic chemicals) and other wastes; and transboundary

movements of these wastes, is very little known. However, currently, the government of Eritrea is aware of the danger of these hazardous wastes posed to human health and the environment. As a result, the Department of Environment is in the process of evaluating the environmental impact of the toxic chemicals generated from the industries and other related firms in Eritrea and thereby to prepare legislation and efficient management procedures. Eritrea has also expressed its willingness to ratify the 1989 Basel Convention and the Bamako (Africa) Convention on the Ban of the Import into Africa and the control of transboundary movements of Hazardous Wastes within Africa as soon as possible. As part of its commitment, Eritrea participated in the meeting held in Pretoria, South Africa from 22-26th of July 1996 which aimed at 'the promotion of Ratification of the Basel Convention and the Establishment of Regional centres for Training and Technology Transfers'. (Menghisteab, 1996)

To protect and reduce the impact of hazardous wastes on human health and the environment, in the first place, Eritrea needs to use or introduce an appropriate technology, trained personnel and efficient management on the process of production. To ensure the realisation and implementation of the above stated objective undoubtedly it is important and crucial to have an enforcing legal instrument and institutional framework.

Moreover, the ratification of the 1989 Basel Convention and incorporation of its provisions into the national law of Eritrea is also important to protect and control the transboundary movement of hazardous wastes and their disposal.

4.2.6 International Convention Relating to Intervention on the High Seas in cases of Oil Pollution casualties of 1969 and protocol of 1973

This Convention was adopted after the TORREY CANYON disaster of 1967 which revealed certain doubts with regard to the powers of States, under public international law, in respect of incidents on the High Seas. This led to a question as to what measures should be taken by the coastal State to protect its territory from pollution, especially if the measures are likely to affect the interests of foreign ship owners, cargo owners and even the flag States.

As a result, this convention empowered the coastal state to take measures on the High Seas as may be necessary to prevent, mitigate or eliminate danger to its coastline or related interests from pollution by oil or the threat thereof, following upon maritime casualties. However, it takes such action only as is necessary, and after due consultations with appropriate interests such as the flag state or states. On the other hand, the convention states that if a coastal state takes measures beyond those permitted under the convention it is liable to pay compensation for any damage caused by such measures.

The convention applies to all seagoing vessels except warships or other vessels owned or operated by a state and used on governmental non-commercial services.

However, a need arose to amend the 1969 International Convention involving pollution by oil. In view of the increasing quantity of other substances, mainly chemicals carried by ships, some of which would, if released, cause series hazard to the marine environment. Thus, a protocol was adopted in November 1973 and entered into force in March 1983 to cover substances other than oil. This protocol extends the regime of the 1969 Intervention Convention to substances. Furthermore, the convention was amended in July 1991 and entered into force in March 1993 to revise the list of substances drawn up in 1974 to assist the application of the 1973 protocol. Again it was amended in July 1996 and entered into force in December 1997 to revise the list of substances attached to the 1973 protocol, following the adoption of a new criteria for their selection.

In respect of intervention on the high seas in the event of a pollution casualty, UNCLOS makes some additions to the Intervention Convention. These are expressed in articles 198 and 199 of UNCLOS regarding notification of other states in case of pollution from a maritime casualty or threats; and regarding co-operation between States after pollution has occurred, respectively. However, article 211 stresses that "…does not prejudice the right of a state to take action along the lines laid down in the Intervention Convention".

Eritrea has not yet ratified this convention. Taking into consideration the fact that of the Red Sea was designated as a Special Area in MARPOL 73/78 it will remain

vulnerable to pollution by the increasing traffic of oil tankers unless the convention is ratified as soon as possible.

4.2.7 International Convention on Liability and Compensation for Damage in connection with the carriage of Hazardous and Noxious Substances by Sea, (HNS Convention, 1996)

This Convention was adopted in May 1996 and has not yet entered into force. The Convention provides for a compensation and liability regime for incidents involving hazardous and noxious substances (HNS). Liability and Compensation regimes for oil pollution incidents are covered by the 1992 protocols to the International Convention on Civil Liability for Oil Pollution Damage 1964 and the International Convention on the establishment of an International Fund Compensation for oil Pollution Damage, 1971. It limits the strict liability of ship owners to amounts based on gross registered tonnage in case of damage in connection with carriage of hazardous and noxious substances by ships. It also establishes a fund to which importers of such materials contribute (primarily chemical companies). It covers not only pollution but also the risks of fire and explosion, including loss of life or personal injury as well as loss of, or damage to, property.

The Convention will make it possible for up to 250 million SDR (about US dollar 336 million) to be paid out in compensation to victims of accidents involving HNS. A great deal of time was spent defining HNS because of the many types of lists of hazardous and noxious substances. However, after an intensive argument it appears to be convenient to abandon a free-standing list instead of incorporating by reference to an existing list.

As a result, HNS, according to Göransson, M, (1997) is defined, by reference to mean:

- Oils carried in bulk listed in Appendix I of Annex I to MARPOL 73/78 ;
- Noxious liquid substances carried in bulk referred to in Appendix II of Annex II of MARPOL 73/78;

- Dangerous liquid substances carried in bulk listed in chapter 17 of the 1983 International Code for the construction and equipment of ships carrying Dangerous chemicals in bulk;
- Dangerous, hazardous and harmful substances, materials and articles in packaged form covered by the International Maritime Dangerous Goods (IMDG) Code;
- Liquefied gases as listed in chapter 19 of the 1983 International Code for the construction and equipment of ships carrying liquefied Gases in Bulk;
- Liquefied substances carried in bulk with a flash point not excluding 60 degree Celsius;
- Solid Bulk materials possessing chemicals hazardous covered by Appendix B of the Code of Safe practice for solid Bulk Cargoes, to the extent that these substances are also subject to the IMDG Code when carried in packaged form.

The Convention also covers residues left by the previous carriage of HNS, other than those carried in packaged form. The convention defines damages including loss of life or personal injury; loss or damage by contamination of the environment; the costs of preventative measures and further loss or damage caused by them.

The Convention introduces strict liability for the ship owner and a system of compulsory insurance and insurance certificate. For ships not exceeding 2,000 units of gross tonnage, the limit is set at 10 million SDR (about US dollar 13.4 million). For ships above that tonnage, an additional 1,500 SDR is added for each unit of tonnage from 2001 to 50,000; and 360 SDR for each unit of tonnage in excess of 50,000 units of tonnage. The total possible amount the ship owner is liable for is limited to 100 million SDR (US dollar 134 million).

However, the Maritime and Environment Protection Committee (MEPC) has developed a Draft Protocol on Hazardous and Noxious Substances (MEPC 40/14/2, MEPC 40/14/2/1) in order to expand the OPRC to HNS. Thus, the committee adopted, in principle, a new protocol to deal with pollution incidents involving hazardous and noxious liquid substances (chemicals), namely a protocol on preparedness, response and co-operation regarding pollution incidents by hazardous and noxious substances, aiming at adoption formally in the year 2000. The HNS

Convention follows the principle of the International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC Convention).

The proposed protocol, when it comes into force, will ensure that ships carrying hazardous and noxious liquid substances are covered by regions similar to those already in existence for oil incidents. Eritrea has not yet ratified this convention.

4.2.8 The International Convention on Liability and Compensation for Oil Pollution Damage

4.2.8.1 Background

The TORREY CANYON disaster of 1967 became a catalyst for the development of two International Conventions, namely the 1969 Civil Liability Convention and the 1971 Fund Convention. These two Conventions deals with the compensation for pollution damage caused by spills from oil tankers. They are governed by an International regime elaborated under the auspices of the International Maritime Organisation (IMO).

Although the framework for the regimes of the liability and compensation convention were originally the 1969 International Convention on Civil Liability for Oil Pollution Damage (1969 Civil Liability Convention) and the 1971 International Convention on the establishment of an International Fund for Compensation for Oil Pollution Damage (1971 Fund Convention), later on they were amended by two protocols, known as the 1992 civil liability convention and the 1992 Fund Conventions entered into force in May 1996.

4.2.8.2 International Convention on Civil Liability for Oil Pollution Damage (CLC Convention, 1969, CLC protocol, 1976 and CLC protocol 1992)

The Civil Liability Convention (CLC) protocol 1992 entered into force in May 1996. The aim of the CLC is to ensure that adequate compensation is available to persons who suffer oil pollution damage resulting from maritime casualties involving oil-carrying ships.

The Convention states that the liability for damage (oil pollution) rests on the owner of the ship from which the polluting oil escaped or was discharged. According to Jacobson, M (1999), pollution damage is defined as:

> loss or damage caused by contamination. For environmental damage (other than loss of profit from impairment of the environment) compensation is restricted, however, to costs actually incurred or to be incurred or for reasonable measures to reinstate the contaminated environment. The notion of pollution damage includes measures, whether to prevent or minimise pollution damage in the territory, territorial sea or Exclusive Economic Zone (EEZ) of a State party to the convention ('preventive measures'). Expenses incurred for preventive measures are recoverable even when no spill of oil occurs that there was a grave and imminent threat of pollution damage.

Furthermore, the Convention states that 'subject to a number of specific exceptions, this liability is strict; it is the duty of the owner to prove in each case that any of the exceptions should in fact operate. However, except where the owner has been guilty of an actual fault, he may limit his liability in respect of any one incident to 133 Special Drawing Rights (SDR) (about USD179 at current exchange rates) for each tonne of the ship's gross tonnage, with a maximum liability of 14 million SDR (about 18.9 million) for each incident.'

On the other hand, according to Coenen, R the CLC Convention limits the strict liability of ship owners up to USD 205 million for damages from oil pollution incidents by ships and the maximum liability has been increased to US dollar 87 million in the 1992 protocol.

The Convention requires ships covered by it to maintain insurance or other financial security in sums equivalent to the owner's total liability for one incident. It is also applicable to all seagoing vessels actually carrying oil in bulk as cargo, but only ships carrying more than 2000 tonnes of oil required to maintain insurance in respect of oil pollution damage. Furthermore, it covers pollution damage resulting from spills of persistent oils suffered in the territory (including the territorial sea) of a state party to the convention. It is also applicable to ships which actually carry oil in bulk as cargo, i.e. generally laden tankers. Spills from ships other than tankers are not covered, nor is it possible to recover costs when preventive measures which are so successful that no actual spill occurs. The ship owner can not limit liability if the incident occurs as a result of the owner's personal fault.

However, the 1969 CLC Convention regarding the limit of liability was considered very low in providing a compensation fund in the event of a major pollution incident. As a result, the 1992 protocol was adopted amending the 1969 CLC and the 1971 Fund Convention. The protocol of 1992, adopted in November 1992 entered into force in May 1996, provides higher limits of compensation and a wider scope of compensation than the 1969 CLC Conventions and the 1971 Fund Convention.

Accordingly, the compensation limits in the 1992 Convention are stated as follows:

- For a ship not exceeding 5,000 gross tonnage, liability is limited to 3 million SDR (about US dollar 4.1 million);
- For a ship of 5,000 to 140,000 gross tonnage: liability is limited to 3,000 million SDR plus 420 SDR (about US dollar 567) for each additional unit of tonnage;
- For a ship over 140,000 gross tonnage: liability is limited to 59.7 million SDR (about US dollar 80 million).

Furthermore, the 1992 Convention widened the scope of the Convention (comparing to the 1969 CLC and 1971 Fund Convention) to cover pollution damage caused in the Exclusive Economic Zone (EEZ) or equivalent area of a state party. In addition, the 1992 Convention covers pollution damage as the original Convention but environmental damage compensation is limited to costs incurred for reasonable measures to reinstate the contaminated environment. The 1969 CLC Convention and the 1971 Fund Convention apply only to damage caused, or measures taken, after oil has escaped or been discharged but do not apply to a threat removal measures, i.e. preventive measures which are so successful that there is no actual spill of oil from the tanker involved. However, the 1992 Convention allows expenses incurred for preventive measures to be recovered even when no spill of oil occurs, provided that there was a grave and imminent threat of pollution damage.

The Convention also extends to cover spills from sea-going vessels constructed or adopted to carry oil in bulk as cargo so that it applies to both laden and unladen tankers, including spills of bunker oil from ships unlike the 1969 CLC Convention

and the 1971 Fund Convention that applies to ships that carry oil in bulk as cargo (laden tankers). The 1969 CLC Convention states that claims for pollution damage can be made only against the registered owner of the ship concerned. This does not preclude victims from claiming compensation outside the convention from persons other than the owner. However, this convention prohibits claims against the servants or agents, of the owner. On the other hand, the 1992 CLC prohibits not only claims against the servants or agents the pilot, the charterer (including a bareboat charterer, manager or operator of the ship, or any person carrying out salvage operators or taking preventive measures. The 1992 Convention states that 'a ship owner can not limit liability if it is proved that pollution damage resulted from the ship owner's personal act or omission, committed with the intent to cause such damage, or recklessly and with knowledge that such damage would probably result.'

Although prevention and control of marine pollution is better than recovery of pollution damage to the victims, nevertheless, the convention is very important to hold the ship owner liable. In this respect, Eritrea needs to ratify this convention and incorporate in its national legislation.

4.2.8.3 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (Fund Convention, 1971) and Protocols (Fund protocol 1976 and Fund protocol 1992)

Although the 1969 CLC provided a useful mechanism for ensuring the payment of compensation for oil pollution damage, it did not deal satisfactorily with all the legal, financial and other matters.

In the light of this, the 1969 International Convention on Civil Liability for Oil Pollution Damage (1969 Civil Liability Convention) as well as the 1971 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1971 Fund Convention) were amended and adopted the 1992 CLC Convention and the International Oil Pollution Compensation Fund 1992 (1992 Fund Convention) respectively, for the purpose of, on the one hand, relieving the ship owner of the burden imposed on him by the requirements of the new convention and, on the other hand, providing additional compensation to the victims of pollution damage. The 1992 Fund Convention, entered into force on May

1996. The International Oil Pollution Compensation Fund 1992 (1992 Fund) was set up under the 1992 Fund Convention, when the latter entered into force.

According to Konan, R the Fund Convention 1971 established a fund to which oil importers contribute, to answer for damages from oil pollution incidents beyond the liability of the ship owner of up to US dollar 87.8 million. This amount has been increased to US dollar 198 million under the 1992 protocol. “The 1969 and 1992 CLC govern the liability of ship owners for oil pollution damage. These conventions lay down the principle of strict liability for ship owners and create a system of compulsory liability insurance. The ship owner is normally entitled to limit his liability to an amount which is linked to the tonnage of his ship.” (IOPC, 1997). The 1971 and 1992 Fund Conventions are supplementary to the 1969 CLC Convention and 1992 CLC Convention respectively.

The objective of the International Oil Pollution Convention (IOPC) is primarily to provide a supplementary compensation to victims of oil pollution damage who can not obtain full compensation for the damage under the applicable CLC convention and to identify ship owners for a portion of their liability under that convention. The International Oil Pollution Compensation Funds 1971 and 1992 (IOPC Funds) are the two intergovernmental organisations that provide compensation for oil pollution damage as a result of persistent oil spills from tankers. “The compensation payable by the 1971 Fund for any one incident is limited to 60 million Special Drawing Rights (SDR) (about US dollar 81 million), including the sum actually paid by the ship owner or his insurer under the 1969 CLC Convention. The maximum amount payable by the 1992 Fund for any one incident is 135 million SDR (about US dollar 182 million), including the sum actually paid by the ship owner or his insurer and the sum paid by the 1971 Fund.”(IOPC, 1997)

Eritrea has not yet ratified this convention and needs to accede to the 1992 Fund Convention in order to secure its compensation in case of marine pollution from oil tankers.

CHAPTER FIVE

5. STRATEGIES TO PROTECT THE ENVIRONMENT FROM MARINE POLLUTION

5.1 Background

Maritime transport, especially oil tanker vessels, which are using ports or are in transit through the coastal waters of Eritrea pose a greatest risk of marine pollution caused from collision, grounding, transfer of oil and bunkers and other marine accidents. A further risk is also posed by petroleum exploration and production activities. Such risks have increased and become a great concern due to the introduction of dangerous and harmful substances to be the transported by sea.

Marine oil pollution is a major hazard. At one extreme a major spill can severely damage the tourist industry, marine life, sea birds; at the other, a series of major spills or operational discharge can deface the pristine beaches and coastlines, which can have subsequent severe economic impacts.

In view of the risks and/or threats of marine pollution damage, Eritrea is at great risk due to its long coastline (about 1200 kms) and the fact that it is along one of the busiest shipping lanes in the world where heavy oil tankers travel, mostly from the Middle East to the Mediterranean and Europe. In addition, the recent oil and gas exploration and the lack of reception and combating facilities, including trained personnel and organisational structure to respond to any oil spill contingency, particularly, in ports and oil terminals, has become of a serious concern.

In the light of this, the aim of this chapter is to analyse the basic principles and schemes to prepare local and national contingency plans as a strategy in respect to marine pollution emergencies by taking into consideration the objective realities of Eritrea in respect of the existing resources, organisational structures, size of coastline

and perceived threats. This is with the view that a plan that has been produced, or is in the course of production, for one country will not necessarily be transposable directly on another. It also analyses the need for integrated coastal zone management (ICZM) as another strategy to protect marine pollution from unplanned use of coastal areas and to harmonise the different governmental and private sectors involved in coastal development.

5.2 Preparedness and Response Strategies for Marine Pollution emergencies.

5.2.1 National Oil Spill Contingency Plan for Preparedness and Response

It is imperative that the policy makers, in order to better prepared to respond to marine pollution incident the national and regional systems for preparedness and response should be developed to fulfil the minimum requirements of article 6 of the International Convention on Oil Pollution Preparedness, Response and Co-operation, (OPRC,1990) which entered into force in May 1995. Article 6 of the OPRC 1990 establishes the following requirements for a national system as a minimum:

1. A State party should establish a national system for responding promptly and effectively to oil pollution incidents. This system should include the following as a minimum:
   (a) the designation of :
      (i) the competent national authority or authorities with responsibility for pollution preparedness and response;
      (ii) the national operational contact point or points, which can be responsible for the receipt and transmission of oil pollution reports as refereed to in article 4 (i.e. oil pollution reporting systems) and;
      (iii) an authority which is entitled to act on behalf of the state to request assistance or to decide to render the assistance requested;
   (b) a national contingency plan for preparedness and response which includes the organisational relationships of the various bodies involved, whether public or private, taking into account the guidelines developed by the International

Maritime Organisation (IMO) contained in section II of the Manual on Oil Pollution.

2. In addition, each State party, within its capabilities, either individually or through bilateral or multilateral co-operation and, as appropriate, in co-operation with the oil and shipping industries, port authorities and other relevant entities, should establish the following:
   (a) a minimum level of pre-positioned oil spill combating equipment, commensurate with the risk involved, and programmes for its use;
   (b) a programme of exercises for oil pollution response organisations and training of relevant personnel;
   (c) detailed plans and communication capabilities for responding to an oil pollution incidents. Such capabilities should be continuously available; and
   (d) a mechanism or arrangement to co-ordinate the response to an oil pollution incident with, if appropriate, the capabilities to mobilise the necessary resources.
3. Each State party should ensure that current information is provided to the organisation, directly or through the relevant regional organisation or arrangements, concerning:
   (a) the location, telecommunication data and, if applicable, areas of responsibility of authorities and entities referred to in paragraph (1) (a) of this article;
   (b) information concerning pollution response equipment and expertise in disciples related to oil pollution response and marine salvage which may be available to another states upon request; and
   (c) its national contingency plan

Furthermore, article 3 of the OPR Convention calls for authorities or operators in charge of vessels, offshore units, seaports and oil handling facilities to have oil pollution emergency plans or (for seaports and oil handling facilities) similar arrangements. In general, the OPRC Convention is an instrument which establishes rules, procedures and guidelines for better international co-operation in combating

major oil pollution incidents or threats. “Response to accidental spillages of oil requires careful advance planning to ensure that the impact of the oil spill is minimised. This is usually accomplished by means of a contingency plan. Such a contingency plan may be defined as a predetermined sequence of communications and actions which can be quickly initiated to cope with an event of possible but uncertain occurrence.” (IMO, 1995)

The objectives of a national oil spill contingency plan are to ensure a timely and effective response to spillages or the threat of spillages of oil. According to the IMO Manual on Oil Pollution, part II, the objectives of such a plan are accomplished by:

- establishing a viable operational organisation with representation from all concerned agencies;
- identifying high risk areas;
- identifying priority coastal areas for protection and clean up;
- providing a minimum level and appropriate types of pre-positioned pollution - response equipment to protect the areas identified in accordance with article 6(2) of the OPRC Convention;
- training operational, middle management personnel; and
- conducting exercises to assess and improve preparedness.

The national oil spill contingency plan should define policy and responsibilities, and identify the authority or lead agency responsible for the preparation and implementation of the plan, together with supporting legislation. The geographic area covered by the plan should be clearly indicated, with reference made to supporting legislation and agreements.

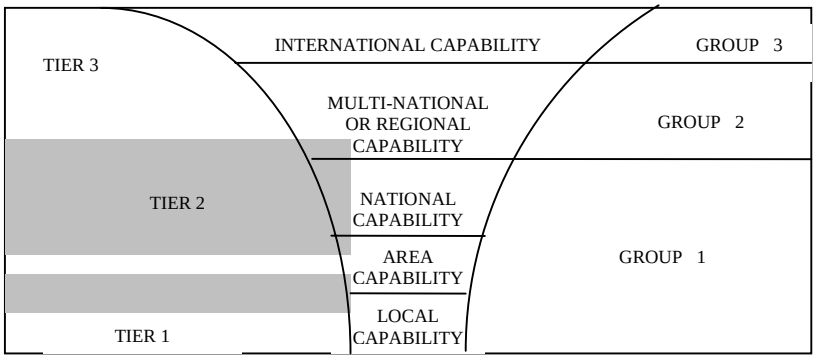
It is also important to create a co-operative approach between the oil and shipping industries in order to establish and sustain an effective response system. The government’s role to establish the legal and organisational framework is crucial to create this relationship. However, the roles of the government and industry should be clearly defined.

The number of levels or categories that a national oil spill contingency plan needs should be identified and each response level needs a corresponding contingency plan.

In developing emergency response planning some countries require fewer levels of response and thus fewer contingency plans. However, a minimum of two response levels or categories should be established, i.e. at national level that requires a national contingency plan and at local level that addresses responses to geographic subdivisions. The local area covers terminal(s) and port(s) within the specified response area or jurisdiction. There is a substantial difference between an oil pollution emergency plan dealing with a whole national coastline and one dealing with a single part or locality. The former is wider in scope while the latter can go into much greater local detail. However, all plans covering a given area must be compatible.

On the other hand, another response level that may be needed is an area response level. This response level may be established in larger countries that require an intermediate response level between the local and the national organisations and it would likely follow the same format as the national level. “It is important to understand the envisaged relationships between national response systems and international oil spill preparedness and response arrangements currently in existence. There are two planning approaches that coexist in the international arena: the industry’s concept of tired response and governmental arrangements at the local, national and regional levels.” (IMO, 1995)

Table 2 The Global Framework for oil pollution response



Source: IMO Manual on oil pollution, part II,1995

Fig 2 shows the relationship between these two approaches with response capability. Tiered response is a widely accepted operational concept that provides a convenient categorisation of response levels and a practical basis for planning. According to section II of IMO Manual on Oil pollution tiered responses are divided into three levels.

Tier One: is concerned with preparedness and response to a small spill within the capabilities of an individual facility or harbour authority. 700 tones is often cited as the upper limit of tier 1; however, the circumstances of the spill and the surrounding environment will determine the actual level of response.

Tier Two: it is concerned with preparedness and response to a spill that requires the co-ordination of more than one source of equipment and personnel. For a tier 2 response, assistance can come from a number of entities within a port area or from sources outside the immediate geographic area. Tier 2 describes a wide range of spill sizes and potential scenarios. Figure 2 depicts a grey boundary either side of tier 2 to reflect this.

Tier Three: concerned with a major spill requiring the mobilisation of all available national resources and, depending upon the circumstances, will likely involve the mobilisation of regional and international systems. It is this tier of response where positive advance customs arrangements are critical to facilitate a successful effort. On the other hand, the second planning approach is the governmental arrangements (the organisation of the international framework). Governmental oil spill preparedness and response arrangements can be “grouped” in the following fashion:

- **Group 1** encompasses the entire national response system;
- **Group 2** consists of any bilateral or multilateral response plans or agreements with other countries as well as regional response bodies; and
- **Group 3** is the network of inter regional plans or agreements. This includes the operation of IMO Oil Pollution Co-ordination Centre and relationships. Both

formal and informal, among the secretariats of the various regional agreements world-wide.

However, as said before, national plans must of necessity reflect the realities of the country they are designed for in respect of existing resources, organisational structure and perceived threat.

At present, Eritrea has not developed its national oil spill contingency plan and lacks the corresponding organisational and physical capability to respond to marine pollution emergencies. The major problems that challenges the State of Eritrea in establishing an effective oil response regime at national and local levels are the following:

- The creation of Eritrea in 1993, as Statehood (nation) is too short. As a result the establishment of its institutional structures are at an embryonic stage,
- A critical shortage of skilled personnel;
- Lack of finance and subsequently the non existent of response equipment;
- Lack of control and enforcement mechanisms (legislation);
- Lack of a clear definition of responsibility of the different sectors involved in coastal and maritime activities;
- Lack of public awareness; and
- Little participation in international and regional maritime organisations.

However, by recognising that the government's prime role of being the 'environmental conscience of the nation' requested for the technical expertise to develop national profiles on pollution. Accordingly, the IMO sent a consultant to Eritrea 'On the assessment of the ability of the state of Eritrea to respond to marine pollution emergencies' from 15-28 October 1995.

The aim of the IMO mission to Eritrea was to carry out an overview study of the existing infrastructure for responding to marine pollution emergencies and recommending ways and means to address the shortcomings. The consultant undertook the following specific actions:

1. Overview of the structures of national marine pollution preparedness and response capabilities, including response to a major marine pollution emergency

in co-operation with neighbouring states and also assessment of the environmental sensitive areas;

2. Preparation of Draft National Contingency Plan (NCP) and its possible linkage to the Gulf of Aden Sub-Regional Contingency Plan; and
3. Identification of specific areas requiring assistance in developing human resources potential, including the institutional strengthening necessary to sustain a viable NCP.

However, the establishment of this National Contingency Plan (NCP) is still suspended. Thus, it is timely and important to make commitment for the development and implementation of this plan, taking into account the danger posed on the Eritrean marine environment by heavy oil tanker traffic, offshore oil and gas exploration, non-existence of oil spill response facilities and lack of trained personnel and organisational arrangements of the oil terminals, ports and oil handling facilities.

5.2.2 Local Oil Spill Contingency Plan for Preparedness and Response

It is important to note that in the event of an oil or hazardous and noxious substances spill at sea or at terminals, time is the most important factor for an immediate response operation. It will be possible to take a quick action to protect or minimise the spillages from getting worse. In view of this, it is necessary that oil terminals, ports and oil handling facilities (or refineries) to have oil pollution emergency plans.

According to part II of the IMO Manual on Oil Pollution an analysis of oil spill incidents between 1974 and 1990 indicates that over 70% occurred in port during loading and discharging operations and a further 12% were from ships in port that were engaged in bunkering operations. The majority of the incidents involved spill volumes of less than 7 tonnes and it is therefore important that the authorities and terminal operators develop plans designed to respond to the most likely spill scenarios.

The authorities or operators should follow the same general outlines as a national contingency plan when preparing seaport, offshore platforms, or oil handling facility

oil spill contingency plans. (See Appendix 2) Potential location of spills and types of oil are more easily identified in ports and terminals. However, in preparing oil emergency plans due consideration should be given to all emergency incidents which could occur, such as collision, groundings and fires. The issues and essential elements of these plans are shown in detail in appendices 3 and 4.

Article 3 of the 1990 Oil Pollution Preparedness, Response and Co-operation (OPRC) gives provisions for the establishment of oil pollution emergency plans by vessels, offshore units, seaports and oil handling facilities. This article states:

1. (a) Each State party is required that ships entitled to fly its flag have on board a shipboard oil pollution emergency plan as required by and in accordance with regulation 26 of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973 as amended by the protocol of 1978 relating thereto, as amended (MARPOL 73/78).

   (b) A ship required to have on board an oil pollution emergency plan in accordance with subparagraph (a) of this article is subject, while in a port or at an offshore terminal under the jurisdiction of a State party, to inspection by officers duly authorised by that state party, in accordance with the practices provided for in existing international agreements (i.e. article 5 and 7 of MARPOL 73/78) or its national legislation.
2. Each State party requires that operators of offshore units under its jurisdiction have oil pollution emergency plans, which are co-ordinated with national system established in accordance with procedures established by the competent national authority.
3. Each State party requires that authorities or operators in change of such sea ports and oil handling facilities under its jurisdiction as it deems appropriate have oil pollution emergency plans or similar arrangements which are co-ordinated with the national system established in accordance with article 6 and approved in accordance with procedures established by the competent national authority.

If petroleum terminals within a port are independently owned and operated, spillages at a terminal should initially be the responsibility of the operator. The port

authorities should be advised of the spill and should take appropriate measures to ensure the safety of other vessels and harbour installations and monitor the clean-up. If the spill proves to be beyond the capability of the terminal operator, the oil handling facility oil pollution emergency plan should make provisions for requesting additional resources from the port authorities or elsewhere.

The oil emergency plan should define accurately the types of incident with which it is intended to deal and who has authority to activate the plan. It should also delineate the geographical area covered by the plan. Reference should be made to any appropriate supporting legislation. The plan must be compatible with other emergency plans in the area.

However, in Eritrea, the two oil terminals located in Massawa have neither established their own organisational nor physical capability to respond to any oil spill that might occur during operational discharge and/or in case of accidents. According to the IMO Mission Report on the assessment of the ability of the State of Eritrea to respond to marine pollution emergencies, 1995 “the two fuel terminals in Massawa receive approximately 25 million litters of black oil annually and four times that much in ‘White’ products.’ This indicates that there is a potential threat of spill to the marine environment during loading and unloading operations.

The two Eritrean ports of Massawa and Assab have also neither the organisational nor physical capability to respond to an emergency of a spill of oil and hazardous and noxious substances. On the other hand, the Department of Maritime Transport (DMT) under the Ministry of Transport and Communications (MTC) has the organisational structure but lacks the physical capability (trained personnel and the necessary equipment). There is no designated person or agency to act as On-Scene Co-ordinator (OSC) which is the most critical element in mobilising the emergency response operations (persons and equipment).

However, recognising the threat of pollution by oil and hazardous and noxious substances posed on the Eritrean marine environment, the DMT considers as its highest priority to fill the gap of its organisational structure as well as to improve the safety and efficiency of the ports and shipping administrations. In demonstrating its

commitment, the DMT puts efforts into sending its employees to acquire knowledge and skills abroad for a higher and middle level education and training. Furthermore, it also exerts unreserved effort to have a technical assistance from IMO, among others, drafting the maritime legislation, maritime safety administration and national contingency plan which are at present in the pipeline. Therefore, in view of this the author believes that in the near future the Eritrean Maritime Administration (DMT), in co-operation with other concerned public and private sectors, will be capable to protect the Eritrean marine environment in particular, and the Red Sea or beyond in general.

5.2.3 International Agreements and Co-operation Responding to Marine Pollution

The development of specific plans under the framework of regional, sub-regional or bi-lateral agreements is very important but they do not replace the existing contingency plans. The underlined issue of regional, sub-regional or bi-lateral agreements is to establish operational arrangements between neighbouring coastal states to respond to marine pollution from oil and hazardous and noxious substances in cases of emergency. (See Appendix 5)

Part II of the IMO Manual on Oil Pollution expresses the need to provide information to the international plan as follows:

- Identification of the competent national authority and national operational contact point responsible for oil spill matters (as stated in article 6(1)(a) of the oil pollution preparedness, response and co-operation, (OPRC, 1990);
- Description of the national oil spill response organisation and if available, the national plan;
- Types of oil spill resources, if any, and the proper method to request them;
- Identification of logistic support facilities within the country available for response; and
- Identification of storage for recovered oil and disposal methods.

The plans for responding to marine pollution should begin within national capabilities. Thus, it is essential that each government which intends to participate in international co-operation first develops and implements a national oil spill response

system and plan. The initiative for such a plan can be conducted in close consultation with domestic organisations, local industry, the International Maritime Organisation (IMO) and specialised United Nations agencies who can provide technical, expertise in risk assessment, behaviour of oil spills on the sea, possible methods of treatment and availability of oil spill response equipment.

5.2.4 Regional Co-operation Responding to Marine Pollution

The international oil spill plans are intended to establish a framework within which two or more governments can co-operate to facilitate the operational aspects of oil spill surveillance and response. The plan can include, but is not limited to:

- Information exchange;
- The use of vessels, aircraft and oil spill response equipment;
- Arrangements of the lead role by the State in whose waters a pollution incident occurs;
- Clear definition of command structure and liaison for joint response operations;
- Identification of priority coastal and sea areas;
- Arrangements for transboundary activities such as the movement of response equipment and personnel in, vessel operations in, or over flying of the territory of other States;
- The conduct of paper and like exercises to test the adequacy of the plan; and
- Arrangements for advisory and technical support.

The geographical area covered by any international oil spill plan should be clearly defined. Areas in which individual States or several States jointly may be responsible for taking actions such as surveillance, reporting, alerting and response activities, should also be clearly defined.

The State in whose zone of responsibility the spill occurs assumes the lead role and is initially responsible for all of the actions taken related to both tracking the spill and any necessary response. The basis on which responsibility is transferred from one State to another must be clearly laid down in any international oil spill plan. Any State involved may escalate the response activities to call upon assistance from other States participating in the plan.

In general terms the main objects of international and regional agreements and co-operations for response to marine pollution by oil and hazardous and noxious substances is to provide support to State parties in the event of marine pollution of large spills which is beyond one member State's national capability.

The main priority area of UNEP is 'oceans' on which it would focus efforts to fulfil its catalytic and co-ordinating role. The Regional Seas Programme was initiated by UNEP in 1974. Since then the governing council of UNEP has repeatedly endorsed a regional approach to the control of marine pollution and the management of marine and coastal resources and has requested the development of regional action plans. The Regional Seas Programme at present includes ten Regions (Mediterranean Region, Kuwait Action Plan Region, West and Central African Region, Wider Caribbean Region, East Asian Seas Region, South-East Pacific Region, South Pacific Region, Red Sea and Gulf of Aden Region, East African Region and South Asian Region) and over 120 coastal States participating in it. It is conceived as an action oriented programme having concern not only for the consequences but also for the causes of environmental problems through the management of marine and coastal areas. Each regional action plan is formulated according to the needs of the region as perceived by the government concerned. It is designed to link assessment of the quality of the marine environment and the causes of its deterioration with activities for the management and development of regional legal agreements and of action oriented programme activities.

The Regional Seas Programme has always been recognised as a global programme implemented through regional components. Interregional co-operation among the various sea areas on common problems is an important element in assuming the compatibility of the different regional components. Furthermore, according to UNEP, 1986 the preparation of the action plan describes as follows:

> The substantive aspect of any regional programme is outlined in an 'action plan' which is formally adopted by an intergovernmental meeting of the governments of a particular region before the programme enters an operational phase. In the preparatory phase leading to the adoption of the action plan, governments are

> consulted through a serious of meetings and missions about the scope and substance of action plan suitable for their region. In addition, with the co-operation of appropriate global and regional organisation. UNEP co-ordinates directly, or in some regions indirectly through existing regional organisations, the preparations leading to the adoption of the action plan. All action plans are structured in a similar way, although the specific activities for any region are dependent upon the needs and priorities of that region.

In the light of this, the Regional Conference of plenipotentiaries on the Conservation of the Marine Environment and coastal areas in the Red Sea and Gulf of Aden was convened in the city of Jeddah, 13-14 February 1982, at the Kingdom of Saudi Arabia by the Arab League Educational, Cultural and Scientific Organisation (ALESCO). (UNEP, 1986)

This Conference adopted the Action Plan for the Conservation of the Marine Environment and Coastal Areas in the Red Sea and Gulf of Aden together with the following two legal agreements:

- Regional Convention for the Conservation of the Red Sea and the Gulf of Aden Environment; and
- Protocol concerning Regional Co-operation in combating pollution by oil and other Harmful Substances in case of emergency.

The Convention for the Conservation of the Red Sea and the Gulf of Aden Environment; and its protocol concerning Regional Co-operation in combating pollution by oil and other harmful Substances in cases of emergency was adopted in February 1982 and entered into force in August 1985.

The contracting parties to this Regional Convention and its protocol, 1982 are:
"The Governments of:

- the Democratic Republic of the Sudan,
- the Hashemite Kingdom of Jordan,
- Palestine represented by the Palestine Liberation Organisation,
- the People's Democratic Republic of Yemen,
- the Somali Democratic Republic,
- the Yemen Arab Republic."(UNEP, 1983)

The main objective of this Convention is to ensure conservation of the environment of the Red Sea and the Gulf of Aden by the promotion, on a regional basis, of environmental protection and natural resources management in the marine and coastal areas of the region. The Convention contains 29 articles and the protocol contains 13 articles.

- The Convention realises that pollution of the marine environment in the waters of the Red Sea and the Gulf of Aden by oil and other harmful or noxious materials arising from human activities on land or at sea, especially through indiscriminate and uncontrolled discharge of these substances, presents a growing threat to marine life, fisheries human health, recreational uses of beaches and other amenities;
- It recognises the need to develop an integrated management approach to the use of the marine environment and the coastal areas which will allow the achievement of environmental and development goals in a harmonious manner; and
- It is aware of the importance of co-operation and co-ordination of action on a regional basis with the aim of protecting the marine environment of the Red Sea and the Gulf of Aden for the benefit of all concerned, including future generations.

However, article XXV of this Convention reads: “The present Convention together with the attached protocol shall be open for signature in Jeddah by Governments of the States of the Red Sea and the Gulf of Aden invited to the Jeddah Regional Conference of plenipotentiaries on the conservation of the Marine Environment and coastal areas in the Red Sea and Gulf of Aden convened from 19 to 15 February 1982.” (UNEP, 1983)

Furthermore, article XXVI (2) addresses “any State member of the Arab League has the right to accede to the present Convention and its protocols.” (UNEP, 1982)

Therefore, Eritrea needs to be a party to the Convention and its protocol in order to protect and prevent the marine resources and respond to any oil spill incidents. Indeed, it also requires the establishment of its own National Oil Spill Contingency

plan. Furthermore, the author emphasises that due considerations and highest priority should be given from the top level for its realisation. This is because Assab port, one of the Eritrean ports located in the southern part of the Red Sea coast, especially the Bab el-Mandab Strait which is amongst the world's busiest sea lanes for international, regional and national traffic of the countries bordering them and beyond is threatened by the heavy oil tanker traffic. In addition, "About 1.5 million barrels per day of oil passes through the Gulf of Aden, corresponding to about 6% of the total seaborne transport of oil." (ITOPF: International Tanker Owners Federation Ltd., 1995) Thus, Eritrea is highly vulnerable to oil pollution by the dense oil tanker traffic. In the case of a major accident of oil spill in Eritrean waters, it would be very difficult and beyond its national capability to respond to such an oil spill accident. Therefore, in order to protect the marine environment, it is timely and important that Eritrea be a party to the regional convention for conservation of the Red Sea and the Gulf of Aden and its protocol. However, before becoming a party to this Convention and its protocol it is of necessity that Eritrea prepares its National Oil Spill Contingency Plan. (See Appendix 6)

5.2.5 Sensitivity Mapping for Oil Spill Response

The IMO Manual on Oil Pollution part II, suggests that a summary of the possible sources of oil spills, resources at risk and priorities for protection should be prepared for the geographic area covered by the international contingency plan, drawing on the information provided in the material plans.

Some stretches of coastline and coastal waters are more sensitive than others to oil pollution. The factors that might influence such considerations are, inter alia, Fisheries; mariculture; birds and other wildlife; areas of particular environmental significance, e.g., wetlands; industrial use of seawater, e.g., in power plants; desalination plants; amenity beaches; yachting and other recreational facilities; and cultural/archaeological sites.

In planning a response to oil spills, a knowledge of coastal sensitivities in the threatened area will enable the best use to be made of available clean-up resources, as it will usually be impossible to protect all of the coastline, and priorities have to be

decided. In order to assist the decision-makers, coastal sensitivity maps may be prepared. Priorities can also be decided on the basis of socio-economic factors; such as fisheries, agriculture, industrial water intakes or tourism or of pure aesthetic reasons. “Making and updating sensitivity maps are key activities in the oil spill contingency planning process. These maps convey essential information to spill responders by showing where the different coastal resources are, and by indicating environmentally sensitive areas. The making of a map involves assembling information on resources and deciding on what guidelines for spill response should be included, through consultation with relevant organisations. This can be done regardless of whether or not the benefits of computerised Geographic Information Systems and databases are available.” (IPIECA: International Petroleum Industry Environment Conservation Association, 1996)

According to IPIECA, 1996, the basic requirements for understandable and easily useable maps are listed below. Fulfilling these requirements involves making potentially difficult decisions about what information to include, and the cartographic skills to present the information clearly.

- The maps must convey an instant message and not require too much specialist knowledge to understand that message;
- They should contain enough information to be of value, but be sufficiently uncluttered to prevent confusion ;
- They should not unnecessarily bisect natural features. For example, a bay or estuary should, where possible, be shown on one map rather than divided between two maps;
- They should use suitable symbols which do not conflict and do not convey the wrong message;
- They should be set at a suitable scale within the inherent accuracy of the data set;
- They should clearly mark scale, direction. Legend/key, date of production and title; and
- They should include a location map to show the relationship between any sub-area and the area as a whole.

In this regard it is important that Eritrea undertakes sensitivity mapping for oil spill response.

5.3 Integrated Coastal Zone Management

The growing trends of population settlement and its subsequent growing demands for agricultural, maricultural and industrial activities in the coastal areas are the major potential threats that are posed on the ecosystem and marine environment. In the past there were no developmental activities on the Eritrean coastal areas and it was scarcely populated except in the two port cities of Massawa and Assab. However, after the independence of Eritrea there have been growing demands for developmental projects which have resulted in the growth of the coastal population. Some of the major coastal and marine developmental activities are coastal and marine tourism, urban development, industrial development, port development, oil and gas exploration, fishery development, and coastal agricultural activities. Therefore, the coastal population growth and the activities that accompany it not only increase marine pollution, but also radically alter coastlines, for example clearing and land reclamation destroy coastal wetlands. Port development, road building, coastal construction, and the mining of beach sand for construction material destroys shoreline habitats. They often increase coastal erosion and damage habitats, such as seagrass beds and coral reef, away from the development site. On the other hand, like other development, tourism brings population pressure and physical changes. The impacts may be especially severe, however, because developers often build tourist facilities too close to the water and other attractions. Thus, areas attractive for tourism becomes highly vulnerable.

The main sources of marine pollution (marine based and land-based) and their threat to the marine environment was discussed in depth in Chapter two. It is clear that the major cause of marine pollution is the human intervention on the marine and coastal areas. This is largely due to a lack of informed constituencies, appropriate institutional structures and commitment from the top.

Furthermore, there are some common characteristics in the management of the coastal areas, inter alia, “increased conflicts among economic development,

environmental protection, and natural resource management objectives; growing numbers of coastal resource users and increasing conflicts among them; multiple-agency authorities and jurisdictions, and little or no co-ordination between levels of government and across agencies within the same level of government; limited or inadequate financial and human resources for management activities; incomplete data, information, and understanding of coastal problems; public and political expectations that coastal problems have immediate solutions." (Eritrean Agency for the Environment: EAE, 1997?)

In order to protect and preserve the marine resources and the environment and thus ensuring sustainability, a proper management and a harmonised system is required. (See Appendix 7)

According to the Rio Declaration on Environment and Development many principles regarding the integral and interdependence of the Earth have been proclaimed, inter alia:

- Human beings are at the centre of concern for sustainable development. They are entitled to a healthy and productive life in harmony with nature;
- States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction;
- The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations;
- In order to achieve sustainable development, environmental protection should constitute an integral part of the development process and cannot be considered in isolation from it;
- States should enact effective environmental legislation, environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards applied by some countries

may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries;

- Environmental impact assessment as a national instrument shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority; and
- Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognise and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.

Thus, in order to protect and preserve the Eritrean marine resources and environment it is important that Eritrea develops an Integrated Coastal Zone Management (ICZM) structure that fits its institutional and governmental arrangement, as well as its traditional, cultural and economic conditions.

O'riordan (1996) recognises four principles of Integrated Coastal Zone Management (ICZM) as listed below:

1. That natural processes of defence and protection should be encouraged, costed properly and fully incorporated into any plan or management scheme.
2. That natural zones essential to this purpose, such as headlands, dunes, salt marshes and wetlands, should be adequately protected by law, cleared of existing settlement, with compensation if necessary, and carefully monitored for their continuing role.
3. That coastal defence works should always be designed sympathetically and encourage the retention of a natural beach, and that cost benefit analyses should recognise the essential linkage between the two.
4. That land-use planning formally take into account the vulnerable areas of cost subject to sea-level-rise and increased storminess, so that no new settlement or economic activity is permitted in such areas, and, where possible, existing buildings are left unprotected, again with compensation where necessary.

It is with this understanding that the Eritrean government published a comprehensive “National Environmental Management Plan - for Eritrea” in 1995. Three of the priorities highlighted on the Integrated Coastal Zone Management in Eritrea are:

1. Development and implementation of an Integrated Coastal Zone Management (ICZM) plan for Eritrea;
2. Baseline information on coral reefs is as that which may be developed for tourism in Eritrea; and
3. Development of coastal and marine protected areas.

However, the priorities in the National Environmental Management Plan for Eritrea are not yet implemented. Therefore, in respect of the threats to the marine environment, it is timely and important that the ICZM Body be established and becomes operational as soon as possible.

CHAPTER SIX

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

In the previous chapters the author endeavoured to present issues of marine pollution whilst expressing observations and opinions on how some of these may be countered or addressed. Hence, from the study it has been established that the present state of the Eritrean marine environment, though damaged to a small extent, the main problems or causes for marine pollution that have already occurred and the great risks that are posed on the marine environment from various sources, which are identified in chapter two, are mainly due to, among others, lack of effective maritime and environmental legislation, the non existence of an institutional framework, lack of co-ordination and co-operation among the governmental agencies, lack of proper industrial and urban waste management and lack of public awareness.

Thus, the conclusions that this study has reached are the need for sectoral co-ordination and harmonisation of the governmental as well as private agencies, the establishment of an institutional and legal framework, establishment of a national oil spill response organisation and proper waste management in order to protect the marine resources and its environment, thereby attaining sustainable development.

6.2 Recommendations

In order to prevent and reduce marine pollution from oil and other Harmful and Noxious Substances (HNS), co-ordination and co-operation among the different governmental and private agencies involved in the coastal and maritime activities and establishment of institutional and legal framework is essential. The reconciliation or balancing of the conflicting interests of the various sectors plays a

crucial role in reducing and protecting the marine environment on the one hand and pursuing economic development on the other.

In order to initiate the necessary actions to address the problems identified in this dissertation the following recommendations are hereby presented:

- Co-operation and co-ordination within the country involves different governmental and private organisations i.e., both those involved in economic development and environmental protection. Thus, there is a need for a balance between these two conflicting interests. This requires an effective co-ordination and co-operation, i.e., an establishment of an Integrated Coastal Zone Management (ICZM) is an important tool in harmonising the two groups of interests;
- The Implementation and enforcement of maritime and environmental laws and regulations should be the foremost requirement for protecting the Eritrean marine environment. The effect of any international instruments largely depends on the enforcement by the contracting party. International conventions are implemented through their integration into national legislation. Enforcement is generally not provided for an international setting but must be arranged in national laws, regulations and decrees. Therefore, Eritrea needs to incorporate the provisions of IMO and other international instruments into its national laws and enforce them to discharge its national and international responsibilities towards the realisation of safer ships and cleaner oceans. However, it should be remembered that the adoption and incorporation of any international conventions and regulations by Eritrea should keep pace with its stage of development to suit existing local or national conditions and circumstances in respect to its international obligations.
- The international marine pollution related conventions should be, as soon as possible, ratified and incorporated into the national laws of Eritrea;
- Eritrea is required to participate actively in the IMO sessions and regional seminars and conferences;
- Regional and international co-operation and co-ordination is important to protect and respond to oil and hazardous and Noxious Substances (HNS) spill in case of

emergencies, especially the Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment; and its protocol (1982). Thus, Eritrea has to sign agreements for mutual assistance with all its neighbouring coastal States both on a bilateral and multilateral basis as it is unrealistic and impossible from an economic point of view to justify the establishment of a contingency organisation in the case of an oil accident catastrophe.

- With about 1200 kms of coast and hundreds of islands, particularly due to the narrow strait of Bab al-Mandeb, which is amongst the most heavily used waterways in the world, Eritrea is constantly threatened by oil tankers passing through its waters. Along its south coast where offshore oil exploration has been underway for sometime there is also another potential threat of marine pollution from oil. In addition, ports and oil terminal operations without having oil contingency planning and the necessary skilled personnel and facilities also pose a great threat to the marine environment. The establishment of Local Oil Spill Contingency Plans and a National Oil Spill Contingency Plan, with its institutional arrangements, should be the focal point in order to combat and prevent the marine environment from oil and other HNS spills.
- It is important that Eritrea prepares coastal sensitivity mapping due to the particular environmental significance. The sensitivity mapping conveys essential information to the users of the coastal and maritime activity as well as to oil spill responders.
- Finally, the author believes that to attain the above recommendations a commitment from the top level is required.

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Map of Bab al-Mandeb
0 20 60 mi
0 50 100 km
RED SEA
NORTH YEMEN
SOUTH YEMEN
Sana
Kamaran I.
Salif
Beihan-el-Qisab
Hodeida
Dhamar
Marsa Fatma
Hanish Is.
Zabid
Ibb
Edd
Danakil Depression
Perim Is.
Taizz
Lahej
Mocha
Assab
Aden
Kululli
DJIBOUTI
Str. of Bab al-Mandeb
Obock
Tadjoura
Gulf of Tadjoura
GULF OF ADEN
Tendaho
Awash R.
Zeila
Aiscia
Djibouti
Lake Abbe
Ali-Sabieh
Berbera
Borama
Hargeisa
Diredawa
SOMALIA

Outline of a national oil pollution emergency plan

1 INTRODUCTION

- 1.1 Purpose and objectives
- 1.2 Authority and applicability
- 1.3 Scope
- 1.4 Definitions and abbreviations

2 RESPONSIBILITY AND ORGANIZATION FOR RESPONSE

- 2.1 Duties of national leadership
- 2.2 National response system
- 2.3 National response priorities
- 2.4 On-Scene Commander's duties and responsibilities
- 2.5 Notifications
- 2.6 Inter-agency participation and support

3 PREPAREDNESS AND PLANNING

- 3.1 National policy
- 3.2 Planning and co-ordination structure
- 3.3 National plan
- 3.4 Area plans
- 3.5 Local/industrial facility plans
- 3.6 International arrangements
  - linkage with other national plans (bilateral agreements)
  - co-ordination with regional arrangements for oil pollution response
  - policy and procedures for requesting international assistance
  - policy and procedures for giving international assistance
- 3.7 Drills/exercise programme

4 RESPONSE OPERATIONS

- 4.1 General pattern of response
- 4.2 Command structure
- 4.3 Communications/command facilities
- 4.4 Specialist teams
- 4.5 Multi-regional response
- 4.6 Health and safety
- 4.7 Response technology
- 4.8 Administration/logistics
- 4.9 Funding, reimbursement, claims

5 REPORTS AND COMMUNICATIONS

- 5.1 Communications systems
- 5.2 Pollution reports (POLREPs)
- 5.3 Post-incident review

Issues to be considered when developing local oil pollution emergency plans

Section 1

The focus of this section is on planning policy and administration. Section 2 will focus on operational matters.

A INTRODUCTION

- Purpose and objective
- Authority and jurisdiction
- Definitions and acronyms
- Geographic boundaries (local, area)

B RESPONSE SYSTEM AND POLICIES

Consider and describe the relationship of the various response plans and systems with which this plan should be compatible.

C ORGANIZATION

- Planning organization
- Response organization

D PLAN REVIEW

- Revision/update requirements
- Exercises/drills

E TRAINING, EXERCISES AND DRILLS

- Training
- Exercises and drills

F AREA ASSESSMENTS

- Area of responsibility
- Planning committee organization(s)
- Area spill history
- Threat analysis

G HEALTH AND SAFETY POLICY

- Public health and safety
- Worker health and safety

H SCENARIO DEVELOPMENT

Scenarios should be explored that range from routine operational spills to the worst-case spill.

I APPLICABLE DOMESTIC AND INTERNATIONAL AGREEMENTS

Section 2

The focus of this section is on operational considerations, not policy. Each chapter and subchapter should have a corresponding checklist developed to assist responders.

A INTRODUCTION

B JURISDICTIONAL BOUNDARIES

C NOTIFICATIONS
- Required notifications
- Local notifications
- International notifications

D COMMAND POST
- Policy and procedures for establishing
- Staffing
- Supplies

E DATA COLLECTION
- Receipt of initial report
- Tracking spill movement (aircraft, spill models)
- Shoreline impact reports/assessments

F OPERATIONAL ADMINISTRATION
- Spill funding procedures
  - Accessing funds
  - Documentation and cost-recovery procedures
  - Damage-assessment procedures
- Required reports
  - Pollution reports – POLREPs
  - After-action reports

G LOGISTICS
- Permits required
- Personnel and personnel support
- Transboundary movement of equipment and personnel
- Information resource hardware

H SPECIALIST TEAMS
- Specialized response teams
- Media and public relations specialists
- Hazardous materials response team
- Specialized salvage teams

I RESOURCE DIRECTORY

- Coast Guard
- Navy
- Environmental agencies
- Fire departments
- Police departments
- Hospitals
- Port authority/harbourmasters
- Marine Pilots Association
- Salvage companies/divers
- Towing companies
- Laboratories
- Water intake facilities
- Environmental interest groups
- Airports and aircraft rental
- Trucking companies/car rentals
- Weather service agencies
- Media contacts
- Volunteer organizations
- Natural resource trustees/administrators
- Local emergency managers
- Fishing fleets
- Vessel operators/agents
- Vac/tank truck companies
- Public transportation and transportation-maintenance agencies

J COMMUNICATIONS

- Communications plan
- Resources

K SENSITIVE AREAS

- Identification
- Prioritizing

L MECHANICAL RESPONSE STRATEGIES

M NON-MECHANICAL RESPONSE STRATEGIES: DISPERSANTS, CHEMICAL AGENTS, *IN-SITU* BURNING AND OTHER SPILL-MITIGATING SUBSTANCES, DEVICES OR TECHNOLOGY

N SITE HEALTH AND SAFETY PLAN

O TRANSPORT, STORAGE AND DISPOSAL OF WASTE

P FUNDING AND COST DOCUMENTATION

Q PUBLIC AND MEDIA RELATIONS

R DEMOBILIZATION AND TERMINATION OF OPERATIONS

Oil pollution emergency plans for offshore units, seaports and oil handling facilities

List of essential elements

A Underlying philosophies

1 Safety of life

2 Fire fighting and safety of navigation

3 Pollution prevention
- routine operations
- blowout prevention for offshore units

4 Response to pollution

5 Consistency with national response system

6 Tiered response philosophy

B Responsibilities/reporting

1 The roles and responsibilities of the major organizations which could be involved are clearly stated and agreed.

2 Operator's responsibilities are clearly established.

3 Established reporting/consultation arrangements with appropriate authorities

4 A predetermined reporting format to allow evaluation and classification of the emergency.

C Response

1 Established procedures to stop the spilling of oil as fast as possible (e.g. oil flow shutdown: blowout prevention, etc.)

2 Personnel trained in above procedures.

3 Implement procedures for warning or evacuation of endangered areas.

4 Access to specialist teams and resources (e.g. for blowouts on offshore units).

D Oil spill clean-up

1 Information on characteristics of oil(s).

2 Oil spill drift- and fate-prediction techniques available for use in response

3 Identification of resources which could be impacted

4 Arrangements in place for rapid deployment of tier 1 response at the spill site

5 Access to tier 2 and tier 3 resources – equipment and personnel

6 Established chain of supply to access and deploy such equipment

E Training and exercises

1 Training and exercise programmes established to ensure that the response activity can be effectively executed.

F Public information

Suggested outline for an international oil pollution emergency plan

1 INTRODUCTION

- 1.1 Background
- 1.2 Purpose and objectives
- 1.3 Scope and geographic coverage
- 1.4 Definitions and abbreviations

2 POLICY AND RESPONSIBILITY

- 2.1 Exchange of information
- 2.2 Designation of national authorities and points of contact
- 2.3 Assumption of lead role
- 2.4 Response planning
- 2.5 Joint training and exercises

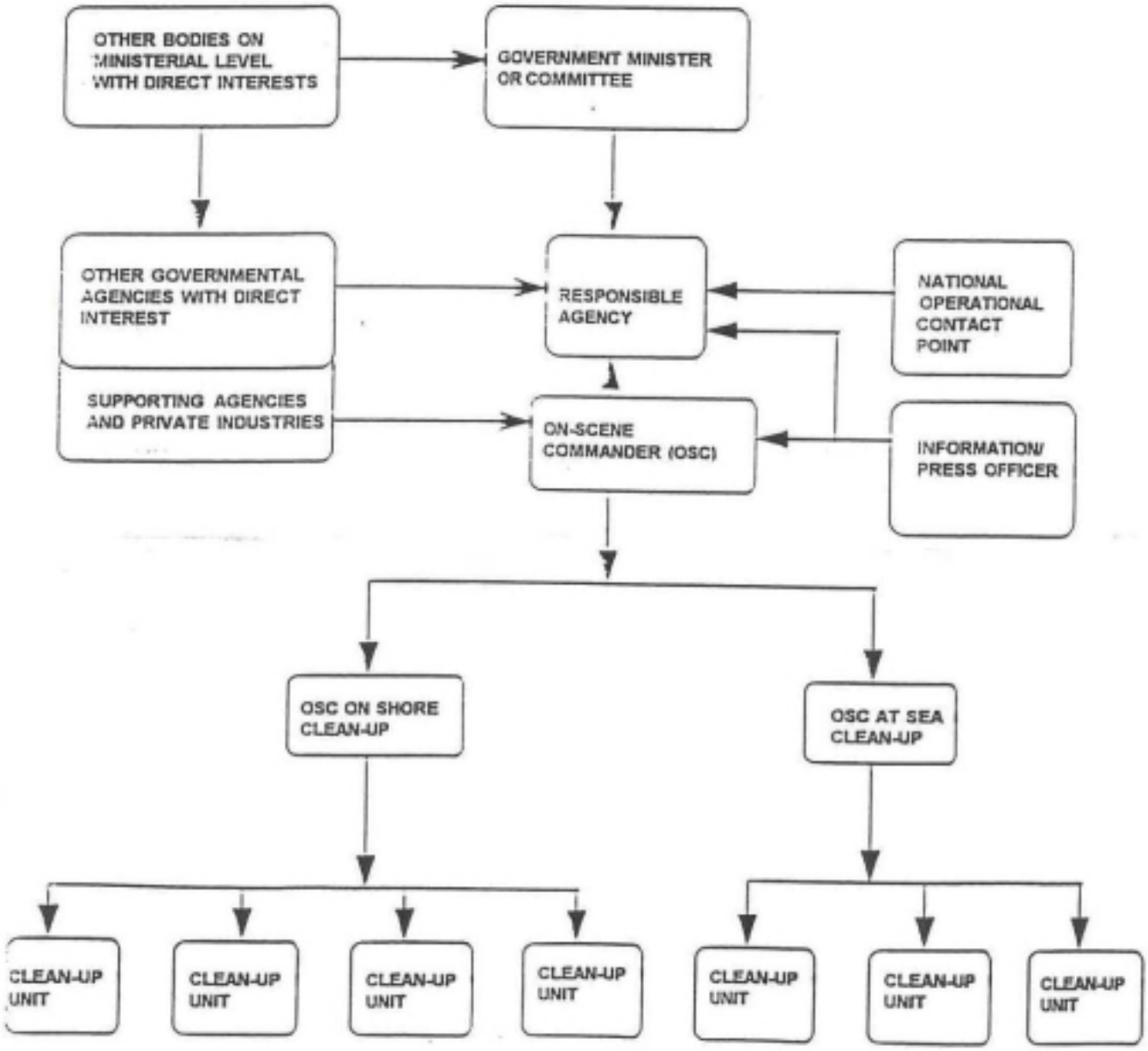
3 RESPONSE ELEMENTS AND PLANNING

- 3.1 Assumption of lead role
- 3.2 National On-Scene Commander (NOSC)/Supreme On-Scene Commander (SOSC)
- 3.3 Emergency Response Centres/Joint Emergency Response Centre
- 3.4 Support teams
- 3.5 Command structure
- 3.6 Communications arrangements
- 3.7 Response planning
- 3.8 Response strategy

4 RESPONSE OPERATIONS

- 4.1 Response phases
- 4.2 Spill surveillance and forecasting
- 4.3 Requests for assistance
- 4.4 Joint response operations

A TYPICAL OIL SPILL RESPONSE ORGANIZATION



Marine Environmental Protection Strategies

Management Framework for Protection of Marine Environment