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INTERNATIONAL LEGAL RESPONSES TO THREATS TO MARINE BIODIVERSITY FROM POLLUTION

BY

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CONTENTS

I **Introduction**

Thank you, Chair of the Session.
Professor Rob Fowler, Chair of Academy's Board of Governors;
Professor Frank Maes, Organizer of this event;
Members of the Board of Governors of the Academy
Representatives of the Institutions which are Members of the Academy;
Dear Colleagues,
Ladies and Gentlemen

I wish to record my profound appreciation to the Organizers of the Eighth Colloquium for the honour you have bestowed on me by inviting me as the Distinguished Speaker for the Colloquium.

May I take advantage of this exceptional occasion to pay special tribute to Professor Nicholas Robinson, the creative and distinguished scholar, a LEADER without whom the IUCN Academy would not exist today. From the brief discussion with a small group of scholars in 1998 at National University of Singapore, he helped us follow the concept of the Academy until April 2003 at the Meeting at the Rockefeller Brothers Centre in New York. There, it was resolved that the Inaugural Colloquium of the Academy would be held from 4th to 6th November, 2003. Professor Wang Xi bravely undertook to host it at Shanghai Jiao Tong University.
That was a courageous move which my colleagues and I were delighted to follow with the hosting of the Second Colloquium in Nairobi in October 2003. I congratulate Nick because himself and his team have never looked back. We are a;; grateful to Professor Robinson for the leadership.

I also congratulate Professor Rob Fowler for taking over the mantle of a Learned Society which is a glowing global success, with the momentum which is moving all of us.

I am delighted to be addressing the 8th Annual Colloquium. The topic of my presentation is "**International Legal Responses to Threats to Marine Biological Diversity from Pollution**".

No doubt, such a presentation will draw heavily on the profuse literature from 1970s when many pioneering scholarly works in environmental law were written. But, first, a great deal has been written since then. Secondly, much of what will be discussed as international legal responses will be treaty law. There have, indeed, been several treaties relating to marine pollution since 1970's. Thirdly, major focus will be on threats to biological diversity rather than pollution as such.

To discuss international legal responses to threats on biodiversity, it is essential that the first section of the paper identify the principal forms of threats. These will be categorized by their sources. Secondly, there will be a small section discussing how the threats relate to the commonly known problem of pollution. The discussion will challenge the conventional definitions of pollution in order that the threats to biodiversity are recognized as such, and however caused.

The third section will discuss the international legal responses specifically as treaty law relating to discharges or spills from ships, from land-based sources and from exploitation of marine mineral resources.

It will be evident that the preferred approach for effective international legal response is through regional arrangements. Pioneering works have already been done through the Regional Seas Programme under aegis of United Nations Environmental Programme. For purposes of this paper, only the latest instrument will be discussed: The Amended Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean.

II SOURCES OF THREATS TO MARINE BIODIVERSITY

1. Introduction

In identifying sources of threat to marine biodiversity we might as well as adopt the conventional outline in discussing sources of marine pollution. These are: (a) threats

from land-based sources; (b) threats from ship-borne sources; and (c) threats from exploitation of marine mineral resources. This is not an exhaustive list. It is illustrative. There are other sources such as military test and pollution through atmospheric transport.

(a) Land Based Sources

Of all possible sources of threats to marine biodiversity, about 80 percent originate from land-based sources. These come in form of substances or energy in municipal wastes, discharges from industries or wash ups from agricultural fields. By and large, the magnitude or volume is relative to the scope of human settlement. The celebrated Agenda 21 tells us that more than half of the world's population lives within 60 kilometres of the sea's shoreline and could rise to three quarters by the year 2020[1].

We note with concern the large volume of solid and liquid loads that reach marine environment their and impact on biodiversity in physical ways. But of particular concern are the pernicious impact of diverse persistent and toxic chemicals such as DDT and Polychlorinated Biphenys (PCB) and heavy metals like mercury , that reach marine environment from land-based sources and with long term effects. Of DDT and PCB one eminent scientist once observed that prediction of its effects on marine biodiversity "… would have been of little concern if both DDT and PCB were not members of a class of compounds known as chlorinated hydrocarbons, substances that are physiologically active in deleterious ways. They are not lethal, as are the nerve gases, but they insidiously interfere with important biochemical processes, leading to unnatural symptoms"[2]. The author points out that even though PCB and DDT were introduced in the environment in 1935, public awareness about its severely negative impact on biodiversity was not roused until Rachel Carson's famous book, *The Silent Spring* was published in 1962[3]. Apart from the long persistence of DDT in marine environment is the widespread area within which it has been traced. Scientists found DDT in the fauna

[1] See Robinson, Nicholas A. (Ed) Agenda 21: Earth's Action Plan (New York: Oceans Publications, Inc. 1993) p. 308.
[2] Harvey, George, "DDT and PCB in the Atlantic" in Oceanus Vol. 18 No. 1 (Fall, 1974) p. 19
[3] Carson, Rachel, The Silent Spring (Houghton Miffling, 1962). Note that an African Edition of the book was published by East African Educational Publishers in Nairobi in 1995. See also Marx , Wesley. The Frail Ocean (Ballantine Books, 1970.

of the Antarctic where no DDT had been allowed[4]. Scientist Edward Wenk, Jr also found DDT residues in the Bay of Bengal, having drifted by wind from East Africa[5]. In which case, it is not only persistence and toxicity but the substances and how they impact on biodiversity but also their capacity to disperse over large areas of oceans.

The capacity to persist in marine environment with very high toxicity is also illustrated in the case of mercury from coastal industries. Edward Goldberg[6], from Scripp's Institute of Oceanography describes the time that lapsed from 1930's when mercury compounds were discharged by a Japanese company in Minamata Bay and the health effect of the population who ate fish contaminated with the mercury and when the cause and effect were diagnosed in 1959.

We simply want to illustrate that the time span when an event leading to an environmental disaster impact on biodiversity and the time of realization of the harm can be decades and may even be centuries. In the Minamata incident production of the toxic chemicals started in 1930's:

> Spent catalysts containing mercury were discharged into the bay and fish and shellfish accumulated the mercury in the form of methyl-mercury chloride. Their consumption by inhabitants of the area, primarily fishermen and their families, resulted in an epidemic of neurological disease. The first occurrence of the disease was reported in 1953, about 15 years after the wastes entered the bay. It was not until 1959, after some 80 cases of neurological disorders had been diagnosed, that mercury was associated with these afflictions.

The point, for purposes of this presentation, is that the category of threats to biodiversity manifests their effects by the harm to humans who consume the fish. In other words, the vitality of biodiversity is vastly impaired by the toxic and persistent chemicals and that the danger may take many years to detect.

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[4] Ritchie-Calder, Lord "Polluting the environment" The Centre Magazine Vol. II May 1969 p. 11 quoted in Okidi, C.O. Regional Control of Ocean Pollution: Legal and Institutional Problems and Prospects (Sijthoff & Noordhoff, 1978) p. 17.

[5] Wenk, Edward, "The Physical Resources often Oceans" in Scientific American" Sept. 1969 pp 168-169 cited in Okidi, *loc. Cit.*

[6] Goldberg, Edward D. "Marine Pollution: Action and Reaction Times" in Oceanus Vol. 18 No. 1 (Fall 1974) pp 6, 12-13.

Before closing the discussion on land-based sources of threat to marine biodiversity, I should briefly say something about wastes dumped into the ocean from ships or aircrafts. Like what has been discussed above, wastes in this category originate from land, particularly industries and agriculture but routed to marine environment differently.

As legal control of discharges of wastes became increasingly stringent in western Europe, handlers of chemical wastes would mischievously discharge chemicals in water ways. For instance, pesticides released in the Rhine in June 1969 killed millions of fish in the river, and of course would have similar impact in the marine environment.[7] In other cases, chemical wastes were loaded in ships or aircrafts for discharge in the sea. One such incident occurred in July 1971 when a Dutch ship *Stella Maris* loaded with 600 tons of toxic chemical wastes set out to dump its load off the Norwegian coast. It was diverted by protests from Norwegian, Danish and Swedish governments which forced its recall[8]. Another incident involved Finnish tanker, *Enskeri* which was loaded with 690 barrels of approximately 16,000 pounds of highly toxic wastes set out for dumping in South Atlantic in March 1975. It was, however, forced to return home by combined protests from South Africa, Brazil and Organization of American States.

Perhaps the really bold incident, if not with utter impunity, was in August 1970 when the United States Army sank a ship loaded with nerve gas canisters in the sea between Florida and Bahamas in what was called *Operation Chase*. Protests by U.S. citizens and states in the Caribbean went unheeded.

We submit the following two observations. First, there is no knowing how many dumping incidents have proceeded unnoticed. The foregoing incidents simply confirmed that dumping was a reality. Secondly, whatever was dumped was likely to have lasting effect on marine biodiversity either by killing the same or rendering the flora and fauna

[7] See discussion in Stein, Robert E. "The Potential of Regional Organizations in Managing Man's Environment" in Hargrove, John Lawrence (Ed) Law, *Institutions and the Global Environment*. (Oceana Publications) pp 253, 266.
[8] For these and the following accounts see Okidi, C.O. op. cit. p. 18 and the footnotes therein.

unviable or unwholesome. Of the latter category we recall that Danish fishermen in northern Atlantic were burned by fish contaminated with German mustard gas dumped by Allies after World War II[9]. The threat to marine biodiversity from dumping of wastes from land is, therefore, very real severe and long lasting. How long, is uncertain and will depend on different categories of substances so introduced. But realization of the consequences on marine environment and biodiversity will also be a matter of time.

Again for purposes of this presentation is the fact that environmental changes with drastic effects on biodiversity can occur over many years and imperceptibly that is important.

(b) Ship borne Sources

Discussions here on discharges from ships will be limited only to oil, which also includes petroleum. The dischargs into the sea are either deliberate or accidental with the latter being a rather recent development having captured global attention since 1960. The deliberate category on the other hand, are a much older practice having evolved with international maritime transportation of oil.

Deliberate discharges comprise instances of tank washing and the discharge residues and ballast water usually when tankers are approaching ports where they reload. The same applies to deballasting. The latter occurs because tankers, when empty, after discharging their loads, are unstable. It is filled with ballast water for reasons of stability and that is normally done without first washing the tank. As the ship approaches sheltered coastal areas what is called ballast water is discharged into the ocean. Both, the ballast water and oily residues in water when so discharged remain within sheltered coastal areas, within 50 miles to 100 miles of the coastline. The volatile proportions evaporate while the residues sink, to affect marine flora and fauna. Until 1960's this was the preponderant ship-borne source of threat of biodiversity.

[9] See Schachter, Oscar and Daniel Serwer, "Marine Pollution Problems and Remedies" in *American Journal of International Law* Vol. 65 (1971) pp. 84, 107 quoted in Okidi, *op. cit*. p. 19

The situation changed dramatically, when the shipping community was shocked by the *Torrey Canyon* disaster in March 1967[10]. In that incident, the collapse of the Liberia registered tanker discharged approximately sixty thousand tons of crude oil, off the coast of Cornwall, Southern England. Nearby beaches were deluged with oil which spread as far out as Normandy and Brittany, about 225 miles away suffocating fish, and benthic species apart from endangering birds and their habitats. Several major tanker accidents followed during the ensuing five years. Wardley Smith of the newly established International Tanker Owners Pollution Federation illustrates the trend as follows.

> "In the United States there was a collision between the "ARIZONA STANDARD" and the "OREGON STANDARD" off San Francisco Harbor in January 1971; in Canada the tanker "ARROW" ran a ground on Gerberus Rock in Chedabucto Bay, Nova Scotia in February 1970; and the "JULIANA" outside the Harbour of Nigiita, Japan in November 1971 must be added to the list of major incidents which have made great impact on both local and world public opinion"[11].

The above are evidence a a worrisome frequency of tanker accidents, a trend which did not end in early 1970's as illustrated by other accidents like *Amoco Cardiz*. One must also mention the alarming *Exxon Valdez* which, on 23rd March 1989, left Port Valdez with 53.04 million gallons of oil on board but grounded and spilled about 10.8 million gallons.As was seen in the *Torrey Canyon* disaster, the spilled oil does not stay in one place. In the case of *Exxon Valdez* a fierce storm swept the oil through Prince William Sound and out into Gulf of Alaska. "Ultimately over 3,200 miles of Alaska's shorelines were oiled from the Sound, past Kenai Peninsula and Kodiak Island to parts of Alaska 1,200 miles distant"[12] from location of origin.

As if to portray the vivid picture for our discussion of threat to biodiversity one author adds thus:

> "The runaway slick left devastation in its wake. Exxon's oil killed more wildlife than any other oil spill in the world – ever. Among the victims were thousands of marine mammals – sea otters, seals, and

[10] For these accounts see Okidi, op. cit. p. 28

[11] J. Wardley Smith "Occurrence, Cause and Avoidance of Spilling of Oil by Tankers" in Proceedings of Joint Conference on Prevention and Control of Oil Spills March 13-15 1973 p. 15 (Washington DC: American Petroleum Institute, Environmental Protection Agency and United Status Coast Guards

[12] See the powerful narrative by Dr. Riki Ott in Sound Truth and Corporate Myths: The Legacy of the EXXON VALDEZ Oil Spill (Cordora, Alaska: Dragently Sisters Press 2005) p. 6

> even oreas, and hundreds of thousands of marine birds – murres, marbled murrelets, harlequin ducks, scoters, buffleheads, goldeneyes, cormorants, and others. Untold millions of salmon and herring were killed by an invisible cloud of dissolved and dispersed oil that spread under water, shadowing the path of the surface slick and hanging offshore from oiled beeches in the Sound"[13].

The author adds that the killing of flora and fauna in such instances does not end with the oil. The company's shoreline clean up killed plants and animal life that survive initial oiling. Pressurized hot water wash long bare the beaches normally covered with rich communities of sea plants and animals.

In summary, deliberate spillage, in terms of deballasting and tank washing tends to be localized, affecting coastal environments including beaches, flora and fauna. Generally, ships resort to this mode of discharge because there are no reception facilities in which to discharge the oily water or wastes.

On the other hand, spills due to tanker accidents are dramatic and devastating, killing birds and fish in a way which provokes public outrage as it also washes the beaches. Invariably, the spill disperses widely to hundreds of miles away from the location of the accident. Scientists from Woods Hole Oceanographic Institution tell us that while documentation of biological effects has been difficult it is known that major spills kill large numbers of intertidal and subtidal benthic organisms and pelagic diving birds, particularly in inshore areas with abundant biota[14].

(c) Threats arising from Exploitation of Marine Resources

Threat to marine biodiversity arising from exploitation of marine resources will, in short-term perspective, arise from exploration and drilling of petroleum and oil. Immediate example in the January 1969 Santa Barbara accidents when a crack in the seabed outside territorial waters of California released crude oil estimated at about 80,000

[13] Ibid
[14] Johnston, Douglas M. (Ed) The Environmental Law of the Sea (Gland Switzerland: International Union for the Conservation of Nature and Natural Resources 1981) p. 247

barrels over the first 11 days[15]. Oil was found on recreational beaches over some ninety kilometres of California coast putting about 500 fishermen out of work.

Today, of course, everyone interested in the subject, is watching events in the Gulf of Mexico where a blowout at British Petroleum oil platform will have released approximately 60,000 barrels a day for about four months.[16] By the time the leak was stopped, after 87 days an estimated 4.9 million barrels had been released into the Gulf of Mexico and was described as "… the largest accidental maritime release of oil, surpassing the 1979 toxic well blowout in Mexico's Bay of Campeche that gushed almost 3 million barrels[17] into the marine environment.

There is no knowing how, in aggregate terms, the amount of discharge in the Gulf of Mexico compares with the long term spills already witnessed in the Delta Region of Nigeria. Shell Petroleum Development Company has been under fire for what is considered as careless release of oil into the environment with vast impact on flora and fauna, conduct that has been roundly condemned in a study by United Nations Development Programme[18]. The dispute over l release of oil in the Delta region of Nigeria by Shell was subject of the case, *Wiwa et al v. Shell Petroleum Development Company of Nigeria Limited* which was settled out of Court with payment of US $15.5 million[19].

The effect of these discharges on biodiversity is the same as has been discussed. The point in the above narrative is that discharges from exploitation of natural resources may be widespread and increasing with the demand for oil from offshore sources.

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[15] Hunt, John M. "The Petroleum Problem" in Oceanus Vol. 18 No. 1 (Fall 1974) pp 4-5

[16] This incident received vivid press coverage worldwide as witnessed by regularity in Nairobi newspapers. See Daily Nation (Nairobi) June 17 2010 p. 22; June 5, 2010, p. 21; August 5, 2010 p. 21; June 14 2010 p. 24 and 27-28; June 16 2010 p. 18; and June 17, 2010, p. 22.

[17] Daily Nation (Nairobi) August 5, 2010 p. 21.

[18] United Nations Development Programme (UNDP) Niger Delta Human Development Report (UNDP Nigeria, Abuja 2006) p. 25

[19] The Plaintiffs initiated the suit in the U.S. involving Alien Tort Claims Act 28 U.S.C. No. 10 1350, in United States District Court for the Southern District of New York, 96 (IV 8386. For a detailed discussion of environmental law and the petroleum industry in Nigeria. See Worika, Ibidia Lucky. Environmental Law and Policy of Petroleum Development (Benin City. Gift-Prints Associates, 2002) esp. pp 30-34).

The foregoing should be enough illustrative discussion of the major threats to marine biological diversity. The first broad category is the land based sources, comprising industrial, municipal and agricultural discharges which are all from areas of national jurisdiction or in fact territories of coastal states and hinterland territories. The second category, are ships with a focus on discharges of oil carried for operational or cargoes. Thus, the discharges are essentially sea-borne. Some of the discharges are from coastal areas under national jurisdiction but the majority are from high seas. The third category are discharges from ocean-based exploitation of marine resources with a focus on drilling for oil in ocean areas most of which are under national jurisdiction.

The discussions have ranged from the dramatic and catastrophic impact to gradual and cumulative effect on marine biodiversity. Some of the effects discussed show where the food chain of marine flora and fauna is, the carrier changing the vitality of the biodiversity and later affecting human beings who consume such marine life, sometimes fatally. We are not in a position to discuss short and long term accumulation of the same loads in the benthic zoo – and phytoplanktons, a factor which also affects short and long term vitality of marine biodiversity.

5. Defining Pollution

Our discussion must now turn to the international legal responses to the threats to marine biodiversity which literature show to be evident. What the international legal intervention responds to is generally categorized as marine pollution. This phenomenon must have been known since the beginning of times. But the first modern definition was given in 1971 by the Joint Group of Experts on Scientific Aspects of Marine Pollution (GESAMP) who wrote thus:

> "Introduction by man, directly or indirectly of substance or energy into marine environment (including estuaries) resulting in such deleterious effects as harmful to living resources, hazard to health, hindrance to marine activities including fishing, impairment of quality for use of sea-water and reduction of amenities"[20].

[20] The increasing global awareness with environmental problems which led to the 1968 U.N. General Assembly decision to convene Stockholm Conference on Human Environment also led to formation of GESAMP. Members of the Joint Group of Experts were World Health Organization (WHO), Food and Agricultural Organization of the U.N. (FAO), U.N. Education, Scientific and Cultural Organization (UNESCO), World Metrological Organization (WMO), and Intergovernmental Maritime Consultative

This definition for the term "pollution" has been faulted on two grounds[21]: First, it is explicitly anthropocentric in that the causation is *by man.* In other words the definition exclude from pollution those forms of introduction of substances that are from natural cause, such as seepage of oil, but having the same effect as introduction by man. Scientists from Woods Hole tell us of those forms of introduction even though conceding that quantities have not been estimated. They say

> "Even more difficult is the estimate of oil entering the oceans from natural seeps and atmospheric fallout. There are a few well-defined seeps such as Pitch Lake in Trinidad and the area off Coal Oil Point in California. However, most reported marine seeps have not been quantified or even verified"[22].

Introduction of such oil should be included in definition of pollution and therefore anthropogenic reference to by "man" should be abandoned.

Secondly, reference to introduction actually "resulting" means the definition is limited to established deleterious effects *ext post facto.* This means only instances where deleterious effect have established, a situation which is essential for fixing liability but not for taking preventive or protective action.

In Part I of the 1982 Law of the Sea Convention, Article 1 took care of the second and not the first problem in the definition. To avoid the *ex post facto* implication, it uses the phrase "… which results or likely to result…" On the other hand, it retains the anthropocentric reference to introduction by man. It means the introduction via natural seepage, whatever the magnitude, would not be pollution within the definition of the 1982 Law of the Sea Convention.

That leads to practical and conceptual difficulties because the consequences of that introduction would immediately or in long-term perspectives, be the same. It would lead

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Organization (IMCO). See United nations, The Sea: Prevention and Control of Marine Pollution, U.N. Doc. E/5003 Report of the Secretary General 1971) p. 20.

[21] See Okidi, op. cit. pp 10-12.

[22] Hunt, John M. "The Petroleum Problem" in Oceanus Vol. 18 No. 3 (Fall 1974) p. 4.

to "… deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of the sea water and reduction of amenities". Logically, anything or circumstances which lead to these conditions in the sea, however caused, should qualify as marine pollution and, as we have seen that would cause threats to marine biodiversity[23]. The international legal responses to be examined thereafter must be attempts to address these problems.

III INTERNATIONAL LEGAL RESPONSES

1 Preface

Origins and development of international legal responses to threats against biodiversity are as diverse as the specific categories for which protection have been sought. Of necessity, therefore, this presentation must only be selective and illustrative. We shall, however, discuss the threats according to their different categories:

- Responses to land based threats
- Responses to ship borne threats
- Responses to threats arising from exploitation of marine resources.

In each case, the outline will begin with what Ambassador Tommy Koh, that distinguished and creative diplomat, called "A Constitution for the Oceans". The 1982 United Nations Convention on the Law of the Sea will have made provisions which respond to each of the categories of threats to biodiversity. Other instruments will be discussed thereafter.

2. Responses to threats from Land-Based Sources

Regulation of threats to marine biological diversity or pollution from land-based sources through international responses has been notoriously difficult because only the coastal state has authority to prescribe and enforce the pertinent laws. Thus paragraph 1 of Article 207 of 1982 United Nations Law of the Sea Convention requires states to adopt laws and regulations to prevent, reduce and control pollution of marine environment from land-based sources taking into account internationally agreed rules, standards and

[23] See a definition which concludes that argument in Okidi, op. cit. p. 12

recommended practices and procedures. But they may also take other measures, presumably more stringent than international standards, to prevent, control or reduce pollution.

Evidently, the most important paragraph in that article is the third one which requires states to harmonize their policies on control and regulation of land-based pollution, through regional arrangements. In other words, countries within respective ocean regions are required both, to develop regulatory standards for the control of agents of pollution of the ocean but also to harmonize the standards as regional normative prescriptions. Then Article 213 requires such states to enforce the laws and regulations so adopted and taking into account international standards established through competent organizations or diplomatic conferences whose purpose is control of pollution from land-based sources. Curiously, Article 213 does not expressly urge that enforcement be within regional framework. But that could be inferred from requirements for normative standards being harmonized regionally.

Within the global context, United Nations Environment Programme (UNEP) is the competent organization with the mandate to set applicable international standards for the control of pollution from land-based sources. With the inspiration from the provisions from Law of the Sea Convention, as above, UNEP engineered the evolution of Global Programme of Action (GPA) as the framework within which to evolve guidelines which could be followed by states in evolving measure to control pollution from land-based sources. The aim of the Global Programme of Action is broadly stated as follows.

> "The GPA is designed to be a source of conceptual and practical guidance to be drawn upon by national and/or regional authorities for devising and implementing sustained action to prevent, reduce, control and/or eliminate marine degradation from land-based activities"[24].

As UNEP set out in 1982 to tackle its task on setting guidelines for the control of land-based pollution of the sea it considered as milestones and precedents the regional seas

[24] The document with these GPA information were accessed on http://www.gpa.unep.org/print.html?id=181 on 18th August, 2010.

conventions and related protocols which had addressed the subject, namely North Sea, 1974; Mediterranean, 1976; Kuwait region, 1978; South-East Pacific, 1981; and Wider Caribbean, 1983.

In 1985, Montreal Guidelines for the Protection of the Marine Environment Against Pollution from Land-based sources were issued. These were taken into account in 1992 and reflected in Agenda 21, where UNEP Governing council was invited to convene, as soon as practicable, an intergovernmental meeting on protection of the marine environment from land-based sources[25]. UNEP Governing Council responded through its Decisions 18/31 and 18/32 pertaining to Washington Conference on Global Programme of Action, and on Persistent Organic Pollutants, respectively.

Thus, UNEP's Global Programme of Action for the Protection of the Marine Environment from Land-based Activities and the related Washington Declaration were developed and eventually adopted in 1995. The United Nations General Assembly resolution 51/189 approved institutional arrangements for implementation of GPA while UNEP Governing Council Decision 19/14 in 1997 specified the global and regional implementation for GPA Coordination Office to be set up and operationalized at The Hague in 1998.

Even though GPA is only a hortatory instrument not binding as such, it is, arguably, the highpoint in international legal response to threats to biodiversity that originate from land-based sources. Its main features include urging states to set priorities on effective control and prevention of pollution from land-based sources. It urges states to do forward planning and capacity building. States are also urged to give priority to control municipal waste, industrial and agricultural activities by designing strategies for preventing their deleterious effect from the reaching marine environment or at least, mitigating the same. Several paragraphs in the document urge states to cooperate on regional basis following on examples already set by UNEP's Regional Seas Programme and to seek collaboration of global and regional agencies. Finally, it urges states to set up regional clearing house

[25] See Agenda 21 paras 17.24 and 17.26 in Robinson supra note 1 p. 317.

mechanisms and to develop legally binding instruments among themselves at regional and sub-regional levels.

Clearly, GPA recognizes that development of legally binding and enforceable standards and prevention or control of land based category of threats to marine biodiversity is for the time being, more easily realized through regional arrangements than globally[26]

3. **Responses to Threats from Ships or Vessels**

(a) The Law of the Sea Convention

It was agreed that in discussion of international legal response the first instrument should be the U.N. Convention on the Law of the Sea. Section 5 is entitled "International Rules and National Legislation to Prevent, Reduce and Control Pollution of Marine Environment", under which Article 211 addresses "Pollution from Vessels" which is to to be read to mean ships.

The foremost international legal response to the threats originating from vessels or ships is to require states, acting through competent international organizations or diplomatic conference, to establish international rules and standards for the prevention or control of marine pollution from vessels. Similarly rules of navigation, relating to routing and traffic separation schemes, should also be adopted to minimize threats of accidents which lead to pollution of coastal and marine environments.

States are similarly called upon to develop conditions for enforcement of the regulations on flags of their own registry and, at the same time, specify enforcement measures against foreign vessels in their own ports or internal waters. Differentiated enforcement measures which may be taken by coastal state over foreign vessels should be specified for territorial waters and exclusive economic zone.

[26] For the full study on rationale for regional approach, see Okidi, C.O. *Regional Control of Ocean Pollution: Legal and Institutional Problems and Prospects* (Sijthoff & Noordhoff, 1978) and Okidi, C.O. "Towards Regional Arrangements for Regulation of Marine Pollution" in *Ocean Development and International Law: The Journal of Marine Affairs*. Vol. 4 No. 1 (1977) pp. 1-25

Construction standards which may be enforced on all vessels must only be those which are adopted under the aegis of a competent international organization. In order to reduce the chances of deliberate discharge through tank washing and de-ballasting, applicable vessels are required to be fitted with reception facilities in accordance with the prescription of a competent international organization.Although it is not mentioned in the text, it is understood that the competent international organization on shipping matters is the Intergovernmental Maritime Organization (IMO). The provisions of the convention enjoins coastal states to enter into regional cooperative arrangements for promotion of control and prevention of marine pollution. Such states should harmonize their standards and procedure and in each case to communicate such arrangements to the competent international organization

(b) International Legal Response Through IMO

(i) Background

Inter-governmental concerns over oil pollution of coastal waters commenced in 1920's, leading to the the United States hosting in 1926, the International Maritime Conference in Washington to negotiate an international convention relating to oil pollution.[27] The problem was discussed at technical and legal levels but failed to attract enough commitment to create a legally binding instrument. In 1930 the Conference for the Codification of International law convened at The Hague under the aegis of the League of Nations discussed the subject, really in passing and prepared "Article 6 the protection of the waters of the coastal States against pollution of any kind caused by vessels"[28] made no notable progress. But the boom in world economy following World War II increased sea-borne activities and aggravated de-ballasting, discharge of bilge water and tank flushing raising further concern of the coastal states. The British Government convened a conference in 1954, in London which concluded the International Convention for the Prevention of Oil Pollution,[29] with the U.K. as the depositary.

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[27] See Gold, Edgar, Handbook on Marine Pollution (Arendal, Norway: Gard) 1985 p. 23

[28] League of Nations, Conference for the Codification of International Law. Annex I pp. 179, 214 (1930).

[29] Gold, Loc. Cit.

Meanwhile, the agenda had led the United Nation at its meeting in Geneva, on March 17 1948 to establish the Inter-Governmental Consultative Organization (IMCO), as a Specialized Agency of the U.N., to be responsible for coordination of safety of sea going vessels and sea-going trade.[30] When IMCO's constitutive instrument went into force in 1958 it met for the first time in London in January 1959 and took over administration of the 1954 Convention.

(ii) Responses via IMCO/IMO Conventions 1954 - 1978

It took about a quarter of a century from the time when the first international legal response was put in place in 1954 to the time when the legal regime was considered reasonably complete in 1978. From 1954 to 1971 there were a series of piece meal and episodic responses.

The 1954 initiative focused on limited coastal impacts of deliberate discharges and resolved to declare "prohibited zones" of fifty miles as areas in which ships would not discharge ballast water, oily mixtures of tank flushing or bilge water. Very soon it was realized that by action of wind and ocean currents, such discharges released beyond fifty miles were still carried to coastal areas affecting local amenities and biodiversity. Therefore, another response was a 1962 conference which adopted an amendment to the 1954 convention by expanding the prohibited zone to 100 miles for coastal states which find that desirable but 50 miles was still retained as the prohibited zone for any coastal area worldwide[31]. There was a provision, though, that where a coastal state extends prohibition it would remain in force only if no state objects through IMCO. The 1969 amendment included the requirement for port states to provide reception facilities where

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[30] Muindi, J.P. "An Overview of IMO" presented to Postgraduate Students of the University of Nairobi at U.N. Complex, Gigiri 25th January 2005. p. 1. J.P. Muindi is the IMO Regional Coordinator for eastern and Southern Africa Region – which covers 24 countries. Ibid p. 25.

[31] For such discussion see Okidi, *Regional Control of Ocean Pollution, op. cit* pp. 30-32; Gold *op. cit.* 23-24. For a rather exhaustive discussion see Swan, Peter N. "International and National Approaches to Oil Pollution Responsibility: An Emerging Regime for Global Problem". Oregon Law Review Vol. 50 (Spring 1970) pp. 504-598.

tankers could throw oily mixtures from their ballasts tanks and bilge water. It is not reasonable to prohibit the captain from discharging the oily water in the ocean, and in fact require them to maintain log books where may discharges may be recorded, when they are not provided with reception facilities for such loads.

The concept of prohibited zones, even upto 100 miles was exploded by the *Torrey Canyon* disaster when oil spilled far outside the territorial water of United Kingdom washed the beach of southern England and drifted to the coast of Normandy and Brittany well over 100 miles away.

(iii) Legal Responses after *Torrey Canyon*

The *Torrey Canyon* accident in March 1967 was an unprecedented disaster. The Liberian registered tanker ran around outside British territorial sea (in international waters) spilling 120,000 tons of oil, The first question was whether UK could properly, under international law, intervene by, for instance, bombing the ship in order to set its volatile fractions on fire and therefore reduce damage to the environment, flora and fauna. Delay due to that legal dilemma was seen to have aggravated environmental harm.

Secondly, harm to the environment including the biodiversity therein, and to interests of adjoining coastal states was unprecedented. Liability would rise to the coastal states as well as public interest environmental groups. For pollution of that magnitude and subsequent ones, there would be liability within the insured scope but it was possible to have damage beyond the scope existing insurance.

Due to the complex and unprecedented legal issues prompted by the *Torrey Canyon*, IMCO established a Legal Committee in 1967 to drive the necessary responses. Within that framework two conventions responding to the two respective problems were developed. Rapid and targeted negations led to adoption of the International Convention Relating to Intervention on the High Seas in case of Oil Pollution Casualties in Brussels on 29th November 1969 (Popularly known as Public Law Convention) under aegis of IMCO. As a response to the predicament in which the U.K. found herself in the *Torrey Canyon* situation, the agreement spelled out circumstance and procedure under which a

costal state could properly intervene in the high seas in order to mitigate effects of pollution casualty on its coastal interests, including impact on biodiversity and amenities.

On the same date, IMCO member states adopted International Convention on Civil Liability for Oil Pollution Damage, (popularly known as Private Law Convention). The convention provides for insurance coverage for ships registered in the contracting states.It was foreseen that in some cases the quantum of liability may be in excess of two thousand francs for each ton of the ship's tonnage or a maximum of 210 million francs specified in the convention. So the tanker owners voluntarily created for themselves a Tanker Owners Voluntary Agreement concerning Liability for Oil Pollution to, hopefully, cover such liability.

The fifth response arising form *Torrey Canyon* was an amendment to the 1954 convention adopted by IMCO Assembly in October 1969 abolishing the rule of prohibited zones completely. The annex to the convention which contained prohibited zones was deleted and restrictive standards previously applied to such zones generalized to the entire ocean.

Let us note, however, that the rule of prohibited zones was used only selectively. For instance it was applied in a 1971 amendment to the convention for the protection of the Great Barrier Reef. IMCO Assembly stated that the amendment sought to maintain and preserve the continuous chain of cays and live corals which extend upto a distance of 1,250 miles from Australian shores in their natural state, free from pollution.[32]

Other than the foregoing lessons from *Torrey Canyon*, it was also reasoned that design and construction of tankers must be improved. For instance, an IMCO Assembly resolution in 1971 called for limitation of sizes of tankers and improvement of internal designs with new technical standards and contracting states required to issue relevant certification of compliance. A distinction was also made between old and new tankers with the requirements that old tankers be phased out. Requirement was introduced for

[32] See Okidi, Regional Control of Ocean Pollution *op. cit*. p. 32 and the citations there under.

new takers to be built with segregated ballast tanks to reduce the chances for oily ballast water often thrown in the ocean.

(iv) Consolidation of Responses in 1973 Convention

Adoption of the International Convention for the Prevention of Pollution from Ships under aegis of IMCO on 2nd November 1973 (popularly known as MARPOL) marked the consolidation of the diverse experiences and international legal responses since 1954, as far as pollution from ships is concerned. It is worth noting that the threat to biodiversity from Land-based sources hit the public domain via the Minamata incident in 1953, the same time as the concern with pollution from ships by oil. Indeed, the Minamata incident as an example of threats from land-based sources, may be considered more invidious than oil pollution. Yet threat from land-based, sources not being as dramatic as those originating form ships, have not galvanized the responses of the international law-makers as has ship-borne threats.

With the experience accumulated since 1954 and subsequent amendments to prevent or control deliberate and accidental discharges of oil and other polluting substances, the drafters of MARPOL decided that the principal convention be in the form of a framework agreement. That would facilitate adoption of implementing regulations which are specific and focused. Provisions in the principal convention are therefore brief and broad.

Thus, Article 1 deals with general obligations of contracting parties under the convention. The following article providing definition of "discharge" may be presumed to be straight forward, the convention says that it does not include dumping of wastes and other matter, from ships or aircraft covered under the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other matter done at London on 13th November 1972. Nor yet does discharge include release of substances from exploration and exploitation of offshore marine resources. Also excluded from definition of discharge under the convention are releases of substances for purposes of legitimate scientific research. The definition of ship, under the convention may also be of interest.

It "means a vessel of any type whatsoever operating in the marine environment and includes hydro-foil boats, air-cushion vehicles, submersible, floating crafts and fixed or floating platforms".

Articles 3 is on application or categories of ships and flag carriers covered by the agreement while the following article covers what constitutes violation of the convention and the penalties. The important question of inspection and special rules on inspection of ships is in Article 5 while what happens when violation is detected and enforcement of the convention is covered in the following article.

As stated earlier, this convention is structured as a framework agreement. Accordingly, Article 14 provides for promulgation of optional annexes under the aegis of IMO. Elaborate provisions are made in Article 16 for amendment of the principal convention as well as protocols and regulations. **Curiously, the important subject of technical cooperation is hidden among final clauses**. But it still remains important as a way of empowering developing countries in shipping industry as well as capacity building in dealing with pollution from ships.

The Convention is popularly referred to as MARPOL 73/78 because its general obligations, provisions relating to implementation of its Annex II, issues of communication and final clauses were modified by Protocol adopted by IMO Assembly on 17the February 1978.[33] But as pointed out earlier, as a framework agreement the Convention is supplemented by several Regulations and Annexes to the extent that most issues of prevention and control of pollution are, each catered for by a given regulation. For instance, there are regulations on Issues or Endorsement of Certificates by another Government (6); Port State Control (8A); Reception facilities (12); segregated ballast tanks, dedicated to clean ballast tanks and crude oil washing (13); Existing oil tankers having special ballast arrangements (13D); Prevention of oil pollution in event of

[33] See International Maritime Organization (IMO), *MARPOL 73/78 Consolidated Edition, 2002: Articles, Protocols, Annexes, Unified Interpretation of the International Convention for the Prevention of Pollution from Ships, as modified by the Protocol of 1978 Relating thereto.* (London, IMO 2002) 511 pages.

collision or stranding (13F); Oil Record Book (20); and Special requirements for drilling rigs and other platforms (21). In all, there are over 25 Regulations and six Annexes each with its own different sub-categories.

Since then an additional agreement entitled, the International Convention on Oil Pollution Preparedness, Response and Cooperation, was also adopted under the aegis of IMO on 30th November 1990. It enables parties to fill the relevant gap not catered for by MARPOL 73/78 or its implementing regulations.

There are probably technical gaps that still exist, as far as prevention and control of deliberate and accidental discharges that might threaten marine biodiversity, is concerned. The general conclusion at this stage must be that international legal responses were slow and episodic from 1954 to 1971. However, the world community led by IMCO (and later IMO) organized comprehensive legal responses in 1973 and 1978 to complete the desirable legal order. How well implementation has worked must be for another study.

4. Responses to Threats from Exploitation of Marine Resources

Previous discussion showed, with examples, the range of threats to biodiversity which can and, indeed do, occurr as a result of exploitation of marine resources. The Law of the Sea Convention, as a framework agreement, has divided them into two categories. Those activities which occur in areas of the subject to national jurisdiction dealt with in Article 208 and those which occur beyond or in the Area covered in Article 209.

Under Article 208 coastal states have powers to prescribe and enforce laws and regulations to prevent reduce and control marine environment arising from or arising from activities in the sea-bed within areas of national jurisdiction. But such national standards must not be less stringent than international standards applicable to the same activities.

States are also urged to harmonize such policies and laws "at the appropriate regional level". It is, in fact, required that coastal states act, through competent regional organizations or diplomatic conferences, to establish global or regional rules, standards and recommended practices and procedures. It is further urged that problems of marine environment in this category be dealt with through regional and global rule-making and enforcement. Such rules and procedures should be reviewed from time to time and, of course, updated to ensure they are relevant to cognate problems.

Article 209, on activities in the Area refers to standards and procedures in Part XI which focuses on the International Sea-bed Area. In the latter Part it is Article 145 which is concerned with marine environment. The Article requires that for degradation of marine environment, including "… damage to the flora and fauna of the marine environment", be prevented or controlled according to rules and standards promulgated through the International Sea-bed Authority.

It seems, then that while coastal states have powers to prescribe and enforce laws applicable in areas of their jurisdiction, the likelihood is that the effective way to deal with the problems is through regional arrangements.

IV RESPONSES THROUGH REGIONAL ARRANGEMENTS

(1) Introduction

Regional arrangements as an approach to regulating threats to marine environmental has been suggested in several instruments discussed so far. In fact, it will be recalled that documents discussing approaches to deal with pollution from land-based sources began by outlining some five regional initiatives under UNEP Regional Seas Programme.[34] The idea was that each region would coincide with marine environmental problem-sheds, beginning with closed or semi-closed seas and the areas such as one quarter of the major seas and oceans of the world.[35]

[34] See text with *supra* note 25.

[35] See Okidi, *Regional Control of Ocean Pollution, supra* note 26 pp. 172-179.

The decision to have regional seas as a specific theme of UNEP's activity within the first year of UNEP's existence and the Mediterranean Sea was first, a project. The regional approach to international legal response was justified on the basis of the following five grounds[36]. First, the degree and kinds of pollution in the various regions require that even if the format is similar, different approaches be followed in control of marine environmental degradation. Secondly, regional mechanisms lead to distribution of remedial technology and facilities in diverse locations making the technologies accessible in case of an ecological catastrophe. Thirdly, regionalization encourages co-ordinated participation of maximum number of states, including developing countries that might otherwise remain on the periphery in a globally centralized system. Fourth, efforts to establish a single global organization have been considered either illusory or futile. At the same time unilateral procedure are generally legally objectionable. Finally, regional approaches provide suitable forms for consultation and confrontation on matters of environment.

By June 2001 the Regional Seas Programme had reached, or at least had plans in place for its 16 regional targets[37]. That list included (1) Mediterranean Region (2) Kuwait Region. (3) West and Central Africa. (4) South-East Asia Pacific Region (5) south Pacific Coast (6) Black sea (7) Wider Caribbean Region (8) Red Sea and Gulf of Aden (9) East Asian Seas (10) East African Region (11) North West Pacific Region (12) South Asian Region (13) South West Atlantic Region (14) Caspian Sea Region (15) Arctic Region and (16) East Central Pacific Region.

There is a need to assess the scope of intervention in the regional response in each of the above cases. But that is impractical in this presentation. It might also be interesting to

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[36] See Okidi, C.O. "Toward Regional Arrangements for Regulation of Marine Pollution: An Appraisal of Options" in *Ocean Development and International Law: The Journal of Marine Affairs*. Vol. 4 No. 1 (1977) pp 1, 13-18. For general discussion on rationale for regional arrangements, see Johnson, Douglas M. Regionalization of the Law of the Sea, Proceedings of the Eleventh Annual Conference of the Law of the Sea Institute November, 14-17, 1977 at University of Hawaii (Ballinger Publishing Co., Cambridge, Mass.) 1978.

[37] UNEP, Status of Regional Agreements Negotiated in the Framework of the Regional Seas Programme. Rev. 5. (UNEP, Nairobi) June 2001.

assess experience in the Mediterranean region, as the oldest project, since 1976. That would be similarly impractical since to date they have adapted eleven instruments, too many for our present purposes.

In our view, it may be sufficient illustration to outline the present status of the East African Regional Agreement, where the original convention was adopted in 1985 but has only recently been amended in March 2010, when **Protocol was also** adopted to deal with Protection of Marine Environment from Land-based Sources and Activities.

(2) Amended Nairobi Convention for the Protection Management and Development of the Marine and Coastal Environment of the Western Indian Ocean.

After several technical and legal background studies[38], UNEP and the Food and Agriculture Organization of the United Nations (FAO) organized negotiations which led to adoption of the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region in Nairobi on 21st June 1985 involving Kenya, France (Re-union), Madagascar, Mozambique, Seychelles, Somalia, Tanzania, Mauritius and Comoros. That agreement did not do very well in implementation and has been subject of many discussions with proposals that it should be amended and updated to bring it in line with recent developments[39].

An amended version of the Nairobi Convention was adopted in Nairobi on 31st March 2010[40] by Comoros, France (Reunion), Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, South Africa and Tanzania. Therefore, this is the latest example of UNEP's initiatives in regional response to threats to marine biodiversity. Given the

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[38] See, for instance FAO/UNEP, Legal Aspects of Protecting and Managing the Marine and Coastal Environment of the Eastern African Region. UNEP Regional Sea Reports and Studies No. 38 (UNEP, Nairobi 1983).

[39] For a discussion of the 1985 Convention, see Okidi, C.O. "Nairobi Convention – Convention and Development Imperatives" in Environmental Policy and Law, Vol. 15 (1985) pp 43-51.

[40] Referenced UNEP(DEPI)/EAF/CPP.6/8&a/Suppl. Dated 31 March 2010.

limited scope allowed for this presentation, it is not possible to do a detailed analysis of this convention, much less try a comparison between the original and amended versions. Instead, it will be sufficient to identify the references to the sources of threat to biodiversity and to ascertain if the provision here is more detailed and prescriptive than under the framework treaties discussed earlier.

Provisions for pollution from ships, dumping, sea bed activities, land-based sources and activities and air borne sources are all as laconical as they were under the framework Law of the Sea Convention. In each case, contracting Parties are called upon to take appropriate measures to prevent, reduce and combat pollution from respective sources. In each instance, the Parties are required to ensure effective implementation of relevant international rules and standards. In addition they are urged to work within the framework of the competent international organization, to ensure that relevant international standards are adhered to.

In the case of land-based sources, the Contracting Parties went further by adopting a Protocol for the Protection of the Marine and Coastal Environment of the Western Indian Ocean from Land-based sources and Activities on 31st March 2010[41]. Contracting Parties, in this instance, are the same as for the Amended Convention, except that Madagascar and South Africa participated in the negotiation but did not sign the Protocol.

Among the land based sources, the protocol identifies the precise sources or categories such as the point and diffuse sources. Then provisions are identified for effective implementation, such as measures for implementation; strategies for compliance and enforcement; common guidelines, standards and criteria; requirements for environmental impact assessment; public participation, and educational awareness; reporting and exchange of information, and scientific and technical cooperation; institutional and financial armaments; and final clauses.

[41] Referenced UNEP(DEPI)/EAF/CPP.6/7a/Suppl. Dated 31 March 2010.

Further, the protocol has four Annexes, viz:

I - Best available techniques and best environmental practices,

II- Priority substances and activities;

- A- Categories of priority substance
- B- Characteristics of substances

III- Data collection, monitoring and evaluation

IV- Environmental impact assessment, evaluation and audit guidelines.

These are, presumably, the kinds of details that are relevant at local/regional levels and which eluded specification under Global Plan of Action. Both, Annex I, spelling out "Best Available Techniques and Best Environmental Practice" and Annex II, which specify "Priority substances and activities' are particularly noteworthy. In these annexes international legal response, through this regional agreement, address one of the critical threats discussed in the first section of this presentation, namely the toxic and persistant substances. An addition, and indeed, central provision in the Convention, is Article II which provides for "Biological Diversity". It has actually replaced and reformulated the provisions of Article 10 in the 1985 Convention which provided for 'Especially Protected Areas".

The new provision in Article II first requires the contracting Parties to individually or jointly, take appropriate measures to conserve biological diversity. They are also required to protect and preserve rare and fragile ecosystems as well as endangered and threatened species of flora and fauna and their habitats in the Convention area.

Secondly, the article requires Contracting Parties, under their jurisdiction, to establish protected areas such as parks and reserves. In such areas the parties are required to regulate and subject, to international law, prohibit any activity likely to adversely impact on such protected areas. The article includes the caveat to the effect that legitimate uses of the sea in such areas will be permitted.

Coincidentally, this establishment of protected areas is a mater which all the parties have taken very seriously, over the past several years. Although not all the measurements of established protected areas are available, information shows that **Comoros** has one area measuring **404 sq. km**. **France has fourteen** such areas of unknown measurement. **Kenya** has established **eleven** such protected areas all measuring 1,631.3 sq. km. **Madagascar** has established **six** protected areas measuring **1,842.1** sq. km**. Mauritius** has **fourteen** such areas measuring **90.9** sq. km. **Mozambique** has established only **three** such areas but rather expansive, measuring **8,950** sq. km. **Seychelles** has established an ambitious **fifteen** such areas but rather small in sizes, totaling only **777.64** sq. km. **South Africa** has established **seven** such protected areas with total of **6,329.5** sq. km. **Tanzania** mainland has established **14** such parks and reserves with a total of **3,414** sq. km. T**anzania – Zanzibar** has established **four** such conservation areas measuring a total of **492** sq. km. In other words, each of the Contracting Parties under Nairobi Convention has shown good faith commitment to protection of biological diversity in the specially protected areas[42]. The trend will be higher when the **British Foreign and Commonwealth Office** (FCO) establishes their proposed marine **protected areas around the 55 tiny islands** called **Chagos Archipelago** as was recently proposed in a study which has identified **10** Important Bird Areas[43].

FINAL REMARKS

As this presentation set out to discuss international legal response to threats posed on marine biological diversity the first task was to identify the sources of the threat. It was concluded that the principal categories of threats are Land-based sources, discharges from ships or vessels and from exploitation of marine resources.

It was also observed that while ship-borne discharges and those from exploitation of resources are dramatic and provoking public outrage, the discharges from Land-based

[42] These data have been assembled by western Indian Ocean Marine Science Association (WIOMSA) a network of experts and institutions with interest in coastal and marine issues. Their coordination office is in Zanzibar.

[43] The FCO have indicated that the information is on their website at: www.fco.gov.uk or British high Commission Port Louis website: www.ukinmauritius.fco.gov.uk or British High Commission in Victoria, website: www.ukinseychelles.fco.go.uk

sources though imperceptible and cumulative in character, do invariably contain lethal doses which find their way through food chain. In the end the latter have heavy impact on biological diversity and on humans.

It was also agreed that the threats to marine biological diversity are forms of marine pollution as defined by GESAMP even though in the definition has undergone some modification upto the version in 1982 U.N. Convention on the law of the Sea. While the two definitions suggest that the threats, posed through pollution, are anthropogenic, we argue here that such is not necessarily the case.

The presentation has shown that while realization of threats from land-based sources occurred during early 1950 the same time as ship-borne threats it was possible to have a comprehensive global response by 1973/78, the time when for land-based sources were treated only to guideline in the form of Global Plan of Action (GPA).

Experience from UNEP Regional Seas Programme shows that regional arrangements are the ideal approach to get countries to agree on detailed prescription of standards for control of land based sources of threats to marine biodiversity. At least coastal states may agree on creation of protected areas, and this practice has been in existence for decades as shown in Western Indian Ocean.