THE ENVIRONMENTAL IMPACT OF DEEP SEABED MINING

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ABSTRACT

The deep seabed until the late sixties was a largely unknown part of the sea and represented nothing more than an academic curiosity. With technology making hitherto hidden depths of the ocean accessible for exploitation, it became known in the late sixties that the deep seabed contained precious minerals. In a world used to shrinking resources, this shot the deep seabed intc the centre stage of world politics, becoming perhaps the most controversial issue in any United Nations Conference. The controversy centered around the legal status of the deep seabed. This work contends that there is not in place any viable international legal regime for supervising and regulating resource development in the deep seabed outside national jurisdiction; that whatever regulations there are, are geared towards facilitating exploitation of the area; that such lacunae would be at an environmental cost that could negate whatever short-term benefits are derivable therefrom.

This work therefore examines the potential environmental impact of deep seabed mining and proposes a legal regime for preventing and minimizing same.

RÉSUMÉ

Le sous-sol marin qui ne représentait rien de plus qu'une curiosité académique est demeuré essentiellement inconnu jusqu'à la fin des années soixantes. Les développements technologiques, en rendant ces profondeurs plus accessibles ont mit à nu les minéraux précieux qui y sont cachés. Dans notre monde où le besoin en ressources nouvelles est insatiable, ces découvertes ont eu l'effet de projeter la question, des sous-sols marins sur la scène politique mondiale, en en faisant ainsi l'un des sujets qui suscitent le plus de contreverses aux Conférences des Nations-Unies. La contreverse porte surtout sur la détermination du statut légal des sous-sols marins. Ce travail soutient: qu'en dehors des juridictions nationales, il n'existe pas aujourd'hui de régime de Droit International viable quant au contrôle et à la réglementation du développement des sous-sols marins; que toutes les réglementations existantes ont pour objet seulement de faciliter l'exploitation de ces profondeurs; que les préjudices que subira l'environnement, en raison de ce vide juridique, aura pour conséquence de nier tout avantage que procure à court terme l'exploitation des sous-sols marins. Ce travail par conséquent examine, du point de vue de l'environnement, l'impact de l'exploitation minière en profondeurs marines et propose en régime juridique dont le but est justement de contrer et de minimiser cet impact.

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INTRODUCTION

"Increase and multiply, and fill the earth, and subdue it, and rule over the fishes of the sea, the fowls of the air, and all living creatures that move upon the earth".[1] This statement is an example of the historic juxtaposition of man against nature - a view that has led to a narrow and crippling anthropocentrism, where all of nature is to Man nothing but a resource.

The relationship between Man and the environment has undergone profound changes due to spectacular scientific and technological developments. These developments had ensured for Man tremendous improvements in his living standards, but it had also been at a cost - substantial impairment to the quality of the environment. It was a cost mankind had assumed could be paid or tolerated by the environment. Not quite so. Recent research indicates that Man's activities, (deliberate and inadvertent) are bringing him and the environment to the brink of "ecocide" i.e., ecological suicide. The explanation is simple - there is a limit to which the environment can support the use and abuse of its resources.

The above observation is particularly true of the ocean. The ocean doubles as the world's last great reserve of mineral and energy resources and its sink. According to R. O'Holloran,[2] every pollutant introduced into the environment will eventually find its way into the ocean.

The ocean has always been an object of fascination,

intrigue and mystery to Man. Throughout history Man has tried to subdue, conquer, exploit and occupy it. Some of these aspirations have proved elusive because of the oceans' intimidating size,[3] its environment and not infrequently its hostility.

The oceans' and seas' inherent international character (they define the coastlines of more than 100 nations) had led Man to devise rules from time immemorial for its use as a common, rules that acknowledge that nations have to share the seas with one another. B.O. Okere correctly attests to this timeless relationship between Man and the oceans; "Maritime activity is as ancient as human history ... The existence of different codes designed to regulate maritime activities provide ready evidence of the importance and primeval role of the sea in the life of Man: the Rhodian code, the Basilika, the Rolls of Oleron, the Law of Wisby, the Hanseatic code, the Black Book of the Admiralty in England, the Consolate del Mare in Spain and the Guide de la Mer in France. These codes belong to all epochs of human history from the Rhodian code of the second B.C. to the modern international conventions. The passage of time has in no way diminished the link between Man and the sea."[4]

Man's initial interests in the sea were limited to defence, communication and food purposes. However exploitation of ocean minerals is also of considerable antiquity. For example salt, bromine and magnesium have been economically

extracted from offshore sea water for sometime. Their extraction has not stirred up much controversy because these minerals dissolve in ocean water and are virtually inexhaustible as they replenish faster than the rate of world consumption.[5]

Although man has from time immemorial made rules regulating the use of the sea, resulting in a complex web of international law, customs, understandings etc., most if not all of these were formulated with the surface areas of the sea in mind, this is because, before World War II, the sea was seen primarily from two dimensional perceptives; surface transportation, fishing, piracy on the one hand and naval operations on the other. Consequently, the bulk of the law of the sea concerned seaborne commerce, fisheries, navigation, tolls, free use of the sea, sovereignty over sea areas, national security, naval warfare etc. The deep seabed until recently was largely unknown and was nothing more than an academic curiosity. Spectacular technological developments have reversed this trend perhaps forever. New and improved ships now make distant sea travel easier and safer, while new mining navigational techniques have opened up hitherto hidden depths of the ocean, thus making exploitation possible in the shallow, dark and rough terrains of the ocean bottom. A development that has been dubbed the 'marine revolution'.

The discovery of manganese nodules in the seabed in commercial quantity brought the seabed to the center stage of

world politics. Although the existence of manganese nodules has been known since 1872, when the British vessel "HMS Challenger" undertook a global oceanographic cruise, academic research concerning the nodules was almost non-existent until the mid-50's. It was only then that researchers prominent amongst whom was E.D. Goldberg began to examine the chemical composition of nodules and theorize upon the mechanism of their formation.[6] However it took the efforts of John Mero to draw the world's attention to the immense potential value of manganese nodules. According to him "Assuming that only 10 per cent of the nodule deposits prove economic to mine, it can be seen that there are, in general, sufficient supplies of many metals in these sea-floor deposits to last for thousands of years at our present rate of consumption."[7]

The discovery of manganese nodules was received with intense excitement if not hysteria. At stake was a pot of gold which was largely conjectural and hence "adaptable to unrestrained fantasy."[8] This excitement should be seen in the context of a world suddenly awakened to the finite nature of resources. Dwindling natural resources from traditional sources had increased the search for opportunities in exploring and exploiting living resources of hitherto untapped regions. The ocean was one of man's last frontiers. The possibilities of a new source of resources from an unexpected source was therefore received with great enthusiasm and high expectations. As Professor Richard Bilder points out the deepsea held

promises of "an emerging world of tremendous potential wealth and significance, one in which rewards of exclusive access and jurisdiction may appear very tempting to states."[9]

Although the ocean has always been a theatre of intense international politicking and its policies have always been shaped by complex political and economic needs of states, no other topic has in recent times generated as much controversy as the seabed. It has had a tremendous impact on international relations. New concepts such as the Common Heritage of Mankind, a United Nations commercial arm - the Enterprise - were born. These new concepts challenged and questioned some basic assumptions of traditional international law, for example freedom of the seas. More significant however, was that the seabed polarized the world into roughly two groups, the developed and the developing nations. These groups were united by one factor - self interest.

Several factors were responsible for this development. For some developed countries seabed minerals were important for both their economic and strategic values. Economically, with their eyes on profit, they argued that individual states should be able to exploit the resources of the seabed without hinderance as part of the well-known freedom of the seas. Some states such as the United States recognized the strategic importance of free and abundant deepsea minerals. The United States imports 99 per cent of its manganese, 91 per cent of nickel, 98 per cent of cobalt and 18 per cent of copper.[10] 60

per cent of the world's land-based manganese reserves are in the U.S.S.R. and South Africa, and almost 90 per cent of world reserves are in these two countries and Brazil, Australia, Gabon and India. The United States therefore reckoned that its present and future national security interests would benefit from "the availability of hard mineral resources which are independent of the export policies of nations".[11] Seabed minerals will accordingly reduce U.S. vulnerability to Opec-type cartels.

The position of the developing countries should be seen in the context of changes in international relations. The first United Nations Conference of 1958 (UNCLOS I) merely ratified a system of ocean law and policy that had been shaped by major developed nations, including the legitimization of continental shelf appropriation. According to L. Henkin "The law of the sea is as old as modern international law. It was essentially reaffirmed and codified as recently as ... 1958. By 1970 it was in disarray."[12] This disarray was due to several factors. Between UNCLOS I in 1958 and UNCLOS III in 1973, the world witnessed important changes relevant to the international policy process in terms of actors, ideology, technology and political contexts. For example many states emerged from Africa in the wake of decolonization, new political alignments were formed, e.g., the group 77 and the non-aligned nations. Many of these newly emergent states, long used to mass poverty regarded the mineral resources of the seabed as a new found

wealth, from the enjoyment of which they could not be excluded. They rejected the freedom of the seas policy because they lacked the technology and capital to embark on individual seabed exploitation. The concept of the 'Common Heritage of Mankind' was born to enable these countries share in the expected profits of deep seabed mining. The divergence of views created an arms length relationship between developing and developed nations. A considerable amount of time was expended in trying to work out a compromise to these antagonistic views during UNCLOS III negotiations.

A third group whose interests were not altogether different from that of the two above is the international business community. Encouraged by the profits realized from off-shore oil drilling, they sponsored scientific researches, seminars,symposia and conferences, to hasten the exploitation of deep sea minerals. For instance Deepsea Ventures Inc. projected that it could start nodule mining and processing by 1976,[13] while Hughes Tool Co. proposed mid-1973.[14] By the early 80's the United Nations reported that 9 entities were engaged in seabed mining activities. Of these 4 were private multinational industrial groups, two were sponsored by France and Japan, and 3 were state-owned programs in the U.S.S.R., India and China.[15]

The optimism of these players was fueled by experts, Dr. J. Mero projected in 1972 that full-time commercial mining "should occur within next five years".[16]

Deep seabed mining was particularly attractive because of its advantages over land-based mining. For example, mining can be done without explosives, it is relatively inexpensive as same equipment could be easily moved and used in various mine sites. Furthermore, supply of the minerals from land-based sources were expected to be outstripped by demand. For instance, it was projected that by 1985 demand for nickel of 2.6 billion pounds will be 200 million pounds greater than the 1980 land production capacity. Seabed mining was expected to offset the shortfall.[17]

It is distressing to note that all international attention was focussed solely on the economic potentials of the seabed. Consequently when the United Nations conference on the law of sea was convened in 1973, nearly all discussions on the seabed centered on the modalities of sharing its mineral resources and expected revenue therefrom. Yet seabed mining raises a host of ecological questions which have unfortunately either been ignored or perfunctorily addressed. As Elisabeth M. Borgese correctly observes "The marine revolution could turn out to be predominately destructive" because "In important ways it is without precedent: starting from a more advanced stage than earlier industrial revolutions this impending transformation allows no time to adjust to change; and it takes place at the confluence of pollution from air, land, and water in a medium that magnifies the effects of miscalculation."[18]

This is particularly surprising in an era when the fragile

nature and intricate interrelationship of the earth's ecosystem has resulted in public support of environmental issues, and has become a powerful instrument for social reform - from the recasting of values and priorities to the redesign of mechanisms of decision-making. Environmentalism in the 80's has emerged as a concept, as a mood, as a perspective and more importantly as a cause.[19]

Thus despite the active involvement of the United Nations in the attempt to establish an acceptable legal regime for the seabed, the potential environmental impact of deep sea mining has not been properly addressed, consequently, there are no adequate rules in place to ensure sound environmental seabed mining.

Fortunately however, there is now a lull in the drive for immediate mining of the seabed due perhaps to the following factors; (a) Recent researches indicate that initial reports of the extent of seabed minerals were probably exaggerated; (b) The technology currently available would in the main make deepsea mining uneconomical; (c) The supplies from land-based sources of some seabed minerals do not appear to be threatened by exhaustion as previously feared; (d) Opposition by land-based producers. For instance, it was expected that by 1985 cobalt from seabed nodules would account for over half of world demand and reduce prices to two-thirds of present levels. A country like Zaire would have lost as much as $88 million in export earnings from such a development;[20] (e) The

unwillingness of major consortia to commit huge resources to a venture that is plagued by considerable uncertainties as to its legal regime. For instance, Thomas C. Houseman, Vice-president of Chase Manhattan Bank, stated in a testimony before a U.S. Senate sub-committee that "In view of the demonstrated desire of the international community to establish control over such activity, the present absence of political sponsorship and security of tenure constitute an unacceptable business risk to a financial institution.";[21] (f) The continued non-ratification of UNCLOS III by many developed maritime states. All these factors have slowed down considerably the intensity and enthusiasm with which deepsea mining was initially pursued. By 1983, forecasts that commercial development of manganese nodules would commence in the 1980's had been modified and pushed back to the 1990's and in some cases beyond. Private mining companies have cut back on project, staff and deferred further investment in exploration and technology development and testing.[22] Current prediction by experts say it will be the second decade of the 21st century before deep seabed mining can begin, if not beyord.[23]

This lull is an environmentalist gain, because it gives the world a unique opportunity to put in place rules and mechinery for ensuring that mining activities in the seabed are conducted on sound environmental principles. This however poses a peculiar problem, because a study on the environmental impact of deepsea mining is a study of a problem existing only

in prospect at least for now. This problem is further compounded by the relative paucity of scientific knowledge of the probable environment impact of deep seabed mining activities. This situation is not helped by the very volatile and emctional political bickering the seabed has generated at UNCLOS III.

Despite these problems we are confident that regulating deep seabed mining prior to actual mining would enable us avoid the shortcomings of previous environmental regulations, most of which only emerged as reactions to environmental disasters. Most of these regulations were largely ineffective especially in situations were the condition of the environment had become terminal because damages were irreversible. We believe that it is environmentally sound to regulate seabed mining comprehensively from the beginning, rather than making piecemeal and ex post facto adjustments. As J. Schneider puts it "A regulatory regime based initially on sound environmental principles is vastly preferable to a 'fire brigade' approach after grave problems begin to flare up".[24] This approach is inevitable in a new field as that under consideration, for as S. Holt explains "Acceleration in the acquisition of knowledge, mainly resulting from technical advances in the means of access to space, is more than matched by rapid increase in uses of the sea, made possible by those same advances. Thus in making a program for marine conservation we are often faced with a need to act before we can know what is happening. This is

particularly true when we examine the problems arising from new uses of ocean space."[25] Furthermore, it is in taking some initiatives that the law can best influence and shape developments.

Of course it is unrealistic to advocate that resources of the seabed be left untapped. With the world's population ever on the increase, every resources will have to be harnessed to ensure high standards of living. This has always led to the classic confrontation between development and economic interests on the one hand and environmental and conservation interests on the other, a conflict which unfortunately has in most cases been resolved in favour of development and economic interests. It is our belief however that these interests are not as antagonistic as they are often portrayed, man can and should harness the resources of the ocean without engaging in destructive exploitation.

It is our contention that there is not in existence any viable international legal regime for supervising and regulating natural resource development in the deep seabed beyond national jurisdiction, and that such lacuna would be at an environmental cost that could negate whatever short term benefits derivable therefrom. We propose in this work therefore to speculate on the potential environmental impact of deep seabed mining and propose a legal regime for preventing and minimizing same.

This work is divided into four chapters excluding this

introductory chapter. Chapter I deals with various aspects of the seabed, such as its geological parameter, resources and management. Chapter II, discusses briefly the methods proposed for mining in the seabed, and the likely environmental impact of such activities. Chapter III, contains the bulk of this work. It will examine various environmental legislation affecting the ocean and discuss the imperatives and modalities for an effective legal environmental regime for the seabed. Chapter IV, will contain observations and conclusions.

The ocean presents us with a unique paradox, it is "the womb of nature and perhaps her grave",[26] to ensure that the ocean never becomes nature's grave demands that ocean law be shaped by its ecology - a goal to which this work is dedicated.

CHAPTER I

THE DEEP SEABED

(a) Geological parameter (Identification and Definition)

Just as air serves as the atmosphere above the dry land and seas, so does the seas and oceans constitute the atmosphere of the submerged land beneath them. This submerged land has been variously referred to as the sea bottom, ocean floor and seabed, although the last of these names is more widely used.

The actual physical structure of the seabed remains largely speculative, because of its hostile and dangerous environment. It is airless, dark, cold, saline, corrosive and for every increase of 33 feet into its depths a person or object is subjected to an additional pressure of 14.7 pounds per square inch.[27] Consequently only a relatively small percentage of it has ever been mapped.[28]

In depth, the sea ranges from the low water at the beach to a maximum of 36,000 feet in the Marinas Trench of the Western Pacific.[29] The sea bottom is far from hegemonous, it is as rough and diverse as the topography of land masses. Geologically, the main divisions of the seabed are the continental shelf, the continental rise, the abyssal plains, isolated mountain peaks, the mid-ocean ridges and their accompanying systems of deep rift trenches.[30] The shelf, slope and rise, constitute approximately 23 per cent of the ocean floor.[31]

A scientific definition (as distinct from a legal

definition) of the continental shelf, has been offered by the United States' National Petroleum Council. It defines it as "the gentle seaward submerged plains bordering on the continents and extending seaward from the shoreline to a point where there is an abrupt descent towards the ocean floor."[32] Geologically, the continental shelf is merely a seaward extension of the continental land mass. The water depth above the shelf may range from 50 to 550 meters.[33]

Most continental shelves vary considerably in width. It is doubtful if any terminates at the 200 meter water limit stipulated by the 1958 Convention on the continental shelf. For instance, the continental shelf of the Pacific bordering states of South America, fall off precipitously to the depth of the abyssal plains within a few feet offshore.[34] Some others, e.g. Brazil and Argentina's, extend out as far as 800 miles from the shoreline.[35] Another type is found in the sea of Okhotsk, where the shelf abruptly descends from the coast to a depth of 150 to 250 meters and then levels off into a broad, relatively flat platform for several hundred miles.[36]

At 150 to 250 meter depth most continental shelves begin to rapidly fall off into the continental slope.[37] The shelf's minimum downward gradient is 0-1° and increases from 4° to 5°.[38]

The continental slope may vary in width between 20 to 100 kilometers beyond the continental shelf.[39] Superjacent water depth over the continental slope ranges between 50 to 550

meters at the junction with the continental shelf to 1,500 meters to the extreme of 5,100 meters at the seaward lower edge.[40] A 2,500 meter depth is generally considered to be the limit of the continental slope.[41]

The continental rise lies beneath the slope. It has been built-up over the years, probably the millennia, by the vast accumulation of continental sediments, carried down the slope and has piled up at the bottom, thus forming a continental rise. It is here that a substantial amount of inorganic manganese nodules have been located. It is still a source of controversy among geologists whether to classify the continental rise as part of the continental (land) mass or the sea floor.[42]

The accumulations of the continental rise drop off rapidly on their seaward side to the abyssal ocean plains. "Nearly 40 per cent of the submarine area is occupied by these deep ocean basins. Certain areas of these immense plains are extremely muddy, while others have a completely hard surface."[43] The basins are extremely flat, with a gradient of less than 1:1,000.[44] The abyssal plains generally start at the 3,000 to 5,000 meter depth, and are periodically punctuated by systems of steep ridges and rises, forming entire subsea mountain ranges, which may culminate in the formation of Islands.[45] About 32 per cent of the abyssal ocean floor consists of these integrated mountain systems which rise 1000 to 3000 meters above the surrounding seafloor.[46] These mountains form the

longest continuous chains on earth and roughly bisect each of the great ocean basins.[47]

There also exist systems of great rift valleys or trenches near each of the mid-ocean mountain. Although occupying less than 29 per cent of the submarine areas they contain the deepest depths of the ocean.[48]

The legal definition of the ocean floor has been more of a political rather than a geological issue, which has pitched states against each other. Most states' policies on the issue are considerably influenced by the configuration and breadth of their continental shelf. The 1958 Convention on the continental shelf rather than make precise delimitation further confused an already murky situation, by its ambiguous provisions. Yet a precise delimitation of the ocean bottom is central to the concept of the 'Common Heritage of Mankind' (CHM), particularly because the most commercially attractive nodules are situated outside the 200 mile Exclusive Economic Zone (EEZ) of coastal states proposed by the draft United Nations Law of the Sea (UNCLOS III). Article 137 of UNCLOS III, vests all rights in the resources of the area "in mankind as a whole on whose behalf the authority shall act." Article I of the draft convention, defines the area as "the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction". It is therefore important that we determine the limits of national jurisdiction.

Art. I of the 1958 Continental Shelf Convention, defines

the continental shelf as: (a) "the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea to a depth of 200 meters or beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas. (b) to the seabed and subsoil of similar submarine areas adjacent to the coasts of Islands." This open-ended definition, literally read may well include almost the entire ocean floor, because modern technology admits of exploitation in virtually all depths of the seabed. Professor Shigeru Oda argues that this provision allocated all submarine areas of the world among coastal states. He contends that it would be necessary to first revise the 1958 convention before any international regime could be established for the seabed.[49] In fact this exploitability provision of the convention has been relied upon by several countries. For instance, Australia has granted exploration permits for an area 200 miles from its coast,[50] Honduras and Nicaragua permit exploration 225 miles offshore,[51] the U.S. under the Outer Continental Shelf Lands Act,[52] has granted leases for "phosphate ... some 40 miles from the California coast ... in ... 4,000 feet of water [and for] oil and gas ... some 30 miles off the Oregon coast in about 1,500 feet of water."[53]

This literal interpretation cannot be correct. As Judge Wilky observes "If at the Geneva Conference the widest limit proposed was the bottom of the continental terrace" and this

"represents the most extensive universal limit that anyone ever had the temerity to suggest, and this proposed limit was rejected, it takes quite a bit of audacity to argue with a straight-face today that the definition actually adopted at Geneva includes the continental terrace. It would indeed be a remarkable result if the most extreme position proposed at Geneva - and resoundingly rejected - should now emerge as the "true" present meaning of the continental shelf. To reach this remarkable result one needs something more than legal scholarship.[54]

The continental shelf doctrine was primarily designed to extend the authority of coastal states, beyond the limits of the territorial seas, to the submarine areas adjacent to their coasts. For instance, the Truman proclamation,[55] (generally credited as the source of the doctrine) declared inter alia: "that ..., the government of the United States regards the natural resources of the subsoil and seabed of the continental shelf beneath the high seas but contiguous to the coasts of the United States as appertaining to the U.S. ..." Thus the doctrine only lays claim to the submerged area that might be regarded as an extension of the landmass,[56] continguity or adjacency between the dry land and the submarine areas was basic to the idea.

The exploitability provision of the continental shelf convention emerged as a compromise solution to the objection of some states, especially South American States, with

disadvantageous continental shelves.[57] The shelves of some of these states fall off precipitously to the depth of the abyssal plains within a few feet off shore. The exploitability provision was designed to compensate such disadvantaged states. However, the convention did not reflect this, but merely set both the precise delimitation and exploitability tests as alternatives.

Despite the ambiguous provision of the convention, it is doubtful if it can be used to support an infinite extension of states' continental shelves. An analogous situation is found in Air and Space Law. The Chicago Convention of 1944, defined national air space in absolute terms, which suggests that a state's sovereignty over its air space extends infinitely skyward. This convention was passed at a time when the possibility of utilizing outer space was not contemplated. Despite the convention, the United Nations has adopted legal principles proclaiming outer space and celestial bodies incapable of state appropriation.[58]

When UNCLOS III was convened in 1973, delimiting the exact parameters of the continental shelf was high on the agenda. Art. 76(1) of the draft convention defines the continental shelf of a coastal state as comprising "the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baseline from which the breadth of

the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance." Art. 76(5) further provides that "the fixed points comprising the line of the outer limits of the continental shelf of the seabed, drawn in accordance with para. 4 (a)(i) and (ii), either shall not exceed 350 nautical miles from the baseline from which the breadth of the territorial sea is measured or shall not exceed 100 nautical miles from the 2,500 meter isobath, which is a line connecting the depth of 2,500 meters."

Annex II of the convention creates a commission on the limits of the continental shelf. By virtue of article 76(8), coastal states are required to submit to this commission, information on the limits of the continental shelf beyond 200 nautical miles from the baseline from which the breadth of the territorial sea is measured. The commission shall make recommendations to coastal states on matters which concern the establishment of the outer limit of the continental shelf. Limits established by coastal states on the recommendations of the commission shall be final and binding.

Article 76(3) expressly excludes coastal states jurisdiction over the deep ocean floor. It states that "The continental margin comprises the submerged prolongation of the land mass of the coastal state, and consists of the sea-bed and subsoil of the shelf, the slope and the rise. It does not include the deep ocean floor with its oceanic ridges or the subsoil thereof."

These provisions of the draft convention were a compromise between coastal states interest in claiming jurisdiction over extensive portions of the ocean and the interest of the international community to exercise jurisdiction over some area. Coastal states interest was satisfied by the extension of their territorial seas and the acceptance of the concept of Exclusive Economic Zone (EEZ). The international community's interest was satisfied by art. 137, which vests resources of the 'Area' "in mankind as a whole." Art. I defines the area as the "seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction".

It appears that the draft convention has successfully avoided the ambiguity of the continental shelf convention. The 2,500 meters limit for national jurisdiction is a more realistic limit than the 200 meter limit prescribed by the continental shelf convention.

This work shall focus primarily on the seabed area outside national jurisdiction, reference to the area within national jurisdiction shall be made only in so far as it is necessary.

We shall next consider the resources of the deep seabed. Before then however it might be useful to mention the Antarctic seabed. The abyssal plains surrounding the Antarctic are thought to have manganese nodule deposits. Under UNCLOS III, these portions of the deep seabed would be regarded as part of the 'Area' and therefore the property of the 'Common Heritage of Mankind' There could be conflicts however in the future,

because except Norway, all Sector claims to the Antarctic extend from the south pole outward to 60 degrees south latitude. Although the claimant states have always denied appropriation of juxtaposed high seas, they might be tempted to claim title to the seafloor below, if the mineral deposits prove to be abundant. Such claims would predictably be resisted by UNCLOS III party states, some of whom have called for the declaration of the entire Antarctic as the property of the 'Common Heritage of Mankind'.

(b) Resources

States have made no pretensions about the fact that the attention presently commanded by the deep seabed is due to its mineral resource potentials. Art. 133 of UNCLOS III defines resources as (a) solid, liquid or gaseous mineral resources in situ in the Area at or beneath the seabed, including polymetallic nodules; (b) resources, when recovered from the Area, are referred to as 'minerals'". This merely gives a physical description of the minerals. Geologically, seabed minerals fall into three categories: detrital, organic and authigenic materials.

(i) Detrital

These minerals are produced by erosion on the shore and the transmission of the particles to the seabed, where they settle to form deposits on or near the surface. Light metals like quartz and feldspur, and heavy minerals like gold, tin, platinum, diamond, iron, sand and monazite

occur in such deposits.[59] It also includes "brown clay" deposits or 'metalliferous muds' which are reported to contain as much as 9 per cent aluminium and 6 per cent iron, plus some amounts of copper, nickel, cobalt and titanium.[60] There are also samples of calcareous oozes with carbonate contents as high as 95 per cent with 25.3 per cent iron, which are a possible source of limestone. Siliceous oozes likewise have a high silica content. Zeolite clays which could be used as fertilizers. The exploitation of these minerals is not however considered commercially viable at present.

(ii) Organic Minerals

They are located in the interior of the seabed and are organic hydrocarbon-deposits formed as an end-product of the partial decomposition of phytoplankton. They are commonly referred to as oil and gas. Offshore oil and gas exploitation on the continental shelf is presently the most viable offshore undertaking. About 50 per cent of hydrocarbon reserves are estimated to lie offshore.[61] In 1974, offshore petroleum production amounted to 2.1 billion barrels representing 20 per cent of total world production.[62] It is estimated that this could rise to between 40 to 50 per cent in the future.[63]

However, the seabed outside national jurisdiction is not likely to be of much significance in oil and gas production, because a vast percentage of oil and gas

reserves has been appropriated by coastal states under the 200 miles Exclusive Economic Zone (EEZ) concept adopted at UNCLOS III. Thus the total oil reserve outside states jurisdiction is estimated as capable of supplying only about 0.0 to 2.0 per cent of world petroleum needs.[64] Further, the terrain of the deepsea makes petroleum exploration in the near future very unattractive given the current state of mining technology.

Coal is another organic substance found in commercial quantity offshore. It is mined from shafts drilled from land or artificial Islands off Canada, U.K., Japan and Taiwan. Offshore coal accounts for 10 per cent of world production.[65]

(iii) Authigenic

These are minerals which have been gradually precipitated from solutions dissolved in seawater. Examples include phosphorite nodules, manganese pavements and nodules. World attention is primarily focused on manganese nodules because of their economic and strategic importance.

Manganese nodules are small blackish potato-sized objects of approximately 15 centimeters in diameter. Eckert describes them as "geologically ancient rocklike materials formed by the precipitation of metallic ions to the abyssal floors of the oceans, where they slowly coast such objects as rocks, the ear bones of whales and the

teeth of sharks."[66] They cover approximately 25 per cent of the abyssal ocean floor and generally lie on the ocean floor at depths greater than 1,000 meters.[67] However, some have been found in less than 6 feet of water in some of the Scottish Lochs,[68] while others have been located at three miles.[69] Experts claim however that nodules worth mining are located below 9,000 feet, with the best lying at 12,000 to 20,000 feet.[70]

The quantity of manganese nodules in the seabed has been largely a matter of conjecture and dispute amongst scholars. As A.M. Post puts it, "the role of educated 'guestimates' in determining nodule deposits continues to command central stage."[71] It is generally believed that there are about 1.5. trillion tons of manganese nodules valued at 3 to 4 trillion dollars,[72] in the seabed of the Pacific Ocean alone. They undergo a cycle of constant renewal, at a rate of about 10 million tons per year[73] - an amount far in excess of world consumption of the constituent minerals. However only about 500 billion tons are economically minable.[74] Even then, if these were mined, they could supply 50 per cent of the world nickel demand, 3.3 per cent of the world copper demand, 28.4 of the manganese demand and 216 per cent of the cobalt demand.[75] Nodule reserves in the Pacific ocean would last at 1960 consumption rates for cobalt 200,000 years, manganese, 400,000 years; nickel, 150,000 years; copper,

6,000 years. By comparison land reserves rate poorly, copper would last 40 years; nickel, 100 years, although supply of manganese appears to be limitless.[76]

Commercial grade nodules are not evenly spread among the world's oceans. The North and South Atlantic and the Indian oceans have low deposits of nodules and crust because, they receive high quantities of continental and biogenic debris; rates of sedimentation are also high and this preclude development of nodules; and potential nuclei of the nodules are removed from the sediment - water interface through burial before accretion of ferromanganese can take place. The Pacific ocean presents brighter prospects. The South Pacific especially around the Peru Basin, in deep waters east of the Marquesas Islands and Tuamotu plateau however also contain low grade nodules. The North Pacific on the other hand contains high quality nodules, especially the area north of the equator. This is probably because the North Pacific ocean receives little continental or biogenic debris. One may therefore conclude that nodules probably flourish in seabed areas of exceptional calm, e.g. the North Pacific, where the growth of other sediments is equal to or less than the rate of nodule formation, unlike the more turbulent bed of the Atlantic.[77]

Manganese nodules is commercially attractive because they contain important minerals like nickel, copper,

manganese and cobalt. These minerals are very useful in heavy industries. Nickel is used in stainless steels alloys, which are strong and corrosion resistant; nickel - alloy steels are used in high-temperature applications such as jet engines and turbines, electroplating, pollution control equipment, the chemical industry, pipes and turbine. Manganese is used in steel making, primarily as a scavenger for removing sulfur, oxygen and trace impurities. When used as an alloy, manganese makes steel more resistant to shock or abrasion. Cobalt has important magnetic and chemical properties, and is resistant to high temperature. It is projected that, at lower prices, cobalt could be substituted for a metal such as nickel.[78]

Nickel production is however regarded as the primary purpose of manganese nodule exploitation, although marketing other by-products could be decisive in determining the viability of the entire operation. For commercial viability, nodules should contain at least 25 per cent manganese, 1.25 per cent nickel, 1 per cent copper and 0.22 per cent cobalt.[79] Although the largest content of nodules is manganese, marketing manganese from seabed nodules is not at present a viable commercial option, because the manganese content of the best deep-ocean nodules is about half the minimum concentration in manganese ore of land-based equivalent and thus it may be considered a waste component at present.[80]

Recently, oceanographers' attention has shifted from manganese nodules to marine polymetallic sulfides (MPS), which are minerals of hydrothermal origin. These are sulfide minerals of heavy metals precipitated from hot (350° to 450°C) aqueous solutions which form ores for strategically important minerals. Although they represent the most exciting geological and oceanographic discoveries in recent years and are potentially important source of valuable metals, their exact worth is uncertain.[81] Some scholars tentatively put their value in billions of dollars.[82]

Manganese nodules are found on the deep seabed around the Antarctic, but their mineral content is less than those found closer to the equator. Consequently, it is thought that mining the Antarctic deep seabed is not likely soon.[83]

Those vast resources of the seabed makes the ocean the world's last great new frontier in an era of "massive mineral consumption and predictable depletion."[84] It is not surprising therefore that the battle for control and management of these resources has been fiercely fought by states. We shall next examine the dynamics of the politics of seabed management and control.

(c) Management and Control

By the late sixties many scientists had given credence to reports of the extensive mineral wealth trapped in the seabed,

and nations started to take more than a passing interest in this new frontier. This interest has led to a protracted controversy on how to exploit these resources. Two main propositions have been proffered; (a) that the seabed and its subsoil be subjected to International jurisdiction and preserved exclusively for peaceful purposes; and (b) that the seabed be subject to the freedom of the high seas capable of exploitation by any state willing and able to do so.

This controversy over the management of the deep-seabed is not new. It is an old conflict representing the two historical thrusts of the law of the sea, replayed on a slightly different plain but this time with more combatants. An inquiry into the continuity and change in ocean politics may help us put current events in their correct historical perceptive. We believe that a clear understanding of the direction of the law of the sea requires an understanding of its old ways. The history of the struggle for dominion and control of the seas and oceans by states is long and tedious. We can only attempt a brief account here.

The history and evolution of the law of the sea is largely a history of centuries of a vicious circle of allocation and demarcation of various portions of the sea to states jurisdiction, and then a dislocation and reconstruction of same. O.R. Cole points out correctly that, it is a history of claims of sovereignty over areas of the seas and decrees declaring boundary lines thereon erected like barriers, "then

torn down only to be reconstructed once again."[85]

Although the seas and oceans constitute an indivisible biological unity, man has partitioned them into several pigeon-holes of control just like the landmass. In the middle ages, feudal law was essentially land law. Its only interest in the sea was fish, which was regarded as 'ferae naturae'. Jurisdiction over maritime zones first emerged when some coastal states laid claim for specific purposes to certain parts of the sea adjacent to their territories. The earliest record of such claims was for fishing and salt extraction rights make by Byzantium under Emperor Leo (889-911 A.D.). This claim entitled owners of the shores to enjoy sole fishing and salt extraction rights for a certain distance from the shore. From this it became recognized that a coastal state had jurisdiction over a strip of the sea which washes its shores, its internal waters, bays and harbors.

The high seas presented a different scenario. In the pre-Roman era, Crete, Athens, other Greek states, Carthage and the early Italian states, all attempted to claim exclusive jurisdiction over the high seas. Consequently, jurisdiction over the high seas depended on the relative naval superiority of states. Since no state enjoyed the monopoly of naval supremacy, victory was transient and defeat cyclic, so too was control of the high seas. P.B. Potter points out that there were no meaningful juridical regimes nor legal practices with respect to the high seas during these times.[86] Later however,

the idea of "freedom of seas," Mare Liberum was introduced into Roman Law probably as early as the 1st century A.D. Marcianus refers to it and states that the sea and its coasts are common to men.[87] It appears however, that the Romans did not practice the principle of freedom of the seas, as they claimed jurisdiction over the Mediterranean basin.

The break-up of the Roman empire ushered in a period of anarchy on the seas with piracy making international trade almost impossible. Both national and international interests dictated that something had to be done to put some semblance of order on the use of the high seas. Thus the principle of Mare Liberum was replaced by Mare Clausum. Under the latter principle, coastal states were given certain jurisdictions in the waters adjacent to their coasts with prescribed breadths. This signalled the birth of what later became known as the 'territorial seas' of a state in international law. State interests, such as safety of commerce, security of coastal territory, revenue, fishery and trade have led to disputes as to the exact extent of the territorial sea, but coastal states have always claimed wider and wider portions of the sea.

The most extensive of these claims in early times was by Spain and Portugal with both nations dividing the great oceans between themselves. Spain claimed exclusive right of navigation in the western portion of the Atlantic, the Gulf of Mexico and the Pacific, while Portugal claimed similar rights in the Atlantic, south of Morocco and Indian Ocean. These

claims were legitimized by the various papal Bulls of 1493 and 1506 and the treaty of Tordesillas of 1494 between Spain and Portugal.[88] This development gave rest at least temporarily to the idea of the high seas as res communis.

The rise of England and the Netherlands as formidable maritime powers, broke the monopoly of Portugal and Spain and the papal bull donation was challenged. England claimed sovereignty over the North Sea and imposed taxes on the Dutch herring fleet fishing off the scottish coast. This was followed by a series of claims and counter claims, resulting in a situation that promoted pirating to a patriotic retaliation and anarchy ensued.

The deplorable situation led to the battle of the books over Mare Clausum and Mare Liberum. The principal intellectual warriors were Hugo de Groot, popularly known as Grotius and James Seldem. Grotius propounded in his book Mare Liberum (1609) that the sea was incapable of exclusive ownership. He advocated the concept of a sea governed by a sense of mutual respect.[89] Grotius' work was essentially a challenge to national jurisdiction over the ocean and the promotion of its common use. His work angered the English Monarch especially as he had criticized the English imposition of fishing tolls on Dutch fishing fleets. John Selden was therefore commissioned by the English to rebut Grotius' contentions. His effort resulted in Mare Clausum, where he attacked Grotius' thesis. He asserted that the right of the state to assert its

sovereignty over seas adjacent to its territory was based on appropriation, dominion and uncontested use.[90]

The series of claims and counter claims continued in the 17th century. The adverse effects of maintaining such a disorderly regime in the ocean was clearly evident as it took a devastating toll on sea commerce. For example many valuable ships and cargoes were lost. It dawned on the rival powers that their claims could only be enforced by sustained superior naval force, the cost of which was becoming prohibitive.[91]

In this rather bleak circumstances, Grotius' idea of a sea common to all, offered the best promise of armistice.

The Dutch jurist Cornelius Van Bynker-Shoek built on Grotius' idea of freedom of the seas.[92] It essentially meant a partial renunciation of state claims to a vast portion of the seas. He however advocated the principle of a national territorial sea or maritime belt adjacent to each nation's coast. More importantly, he held that a state's sovereignty extended as far out to the sea as a cannon shot could reach. The 'cannon shot' rule as it later became known changed with time to the three mile[93] national territorial sea limit and now twelve miles under UNCLOS III. Thus from the 17th century, the twin principles of free use of the sea by all and the right of coastal states to exercise sovereignty over a narrow strip of waters adjacent to their coast, were well established.

The state of the law of the sea at this period was satisfactory as it met all the basic needs of maritime states.

The question whether ocean resources were res nullius (belonging to no person or state), or res communis (belonging to all) was largely irrelevant because fish was the only sea resources of some importance at the time. Apart from certain sea mammals like whales and fur seals, the supply of fish was considered inexhaustible to warrant debate as to ownership. Treaties regulating fisheries in the High Seas were mainly concerned with congestion among fishing fleets in fertile fishing grounds. Although, there were disputes on the exact extent of the territorial seas, but " ... generally, prior to World War II, there was no clear government positions on territorial waters, no attention to the "continental shelf," no authoritative international cases, no uniformity as to fishing claims, and no realization of the importance of a law of the sea to all these issues".[94]

This was the state of the law up to World War II. However, important developments that would change the course of the law of the sea were already taking place. Among these were; (a) Ocean science was making remarkable progress with the compilation of meaningful information regarding the seas - their contents and physical laws; (b) Fishing fleets were growing in size and efficiency; (c) Human population was expanding and the idea of a maximum substainable yield of renewable ocean resources was being popularized; (d) Deep sea diving was being sophisticated; (e) Communication by ocean cable was increasing, thus decreasing the size of the world and

ocean barriers; (f) Large deposits of petroleum resources were discovered in the geological continental shelf of the U.S.; and (g) There were great advances in naval power. Whereas W/W I, severely undermined the international maritime legal order, W/W II completely shattered it. It signalled the departure from the two dimensional era discussed earlier. The two dimensional era according to Marx is an era when nations learned that "The law of the sea does not rise alone from a national claim but from acknowledgment of this claim by other nations".[95]

President Truman of the United States responded to these changes with two proclamations, which had tremendous implications for the development of the law of the sea. The first was the continental shelf proclamation.[96] It declared that the natural resources of the subsoil and seabed of the continental shelf contiguous to the coast of the United States were subject to its jurisdiction and control. The other proclamation shed conservation zones in those areas of the high seas contiguous to the coasts of the U.S. which were or might become substantial fishing grounds. According to Wilbert M. Chapman, the continental shelf proclamation "attempted to change existing international law concerning the seabed, the second attempted to provide a framework for attending to high seas fisheries conservation within the existing regime of the high seas".[97]

The U.S. proclamation ushered in a three dimensional era for the ocean, i.e., the territorial seas, the high seas and

now the continental shelf. Ambassador Arvid Pardo of Malta explains the importance of the continental shelf proclamation thus: "While leisurely academic discussion continued, economic exploitation of the seabed and its subsoil beyond territorial waters had already started. This confronted the technologically advanced countries, particularly the U.S., with the urgent need for a solution to the problem of jurisdiction and control of the land underlying shallow waters beyond the territorial sea. Unilateral action was thus taken, which ..., has decisively influenced the development of the present legal structure. ... undoubtedly the Truman proclamation of 1945 must be considered the first and most significant statement of principle. The proclamation referred to the "continental shelf". This was a relatively new concept in law, although not in science.

In substance, the Truman proclamation declared that valuable petroleum and mineral resources lie on and under the continental shelf, and that modern technology is capable of exploiting them; that there is a worldwide need for these resources; and that, therefore, efforts to develop them should be encouraged. But for this purpose and in the interests of conservation and utilization, recognized jurisdiction over the resources of the continental shelf by the contiguous state is, however, just and reasonable and, therefore the U.S. regarded the resources of the shelf contiguous to the U.S. as "appertaining to the U.S.; and subject to its jurisdiction and

control" without in any way affecting the character of the high seas above the shelf.

... It will be noted that the proclamation totally rejected the concept of the continental shelf as res Omnium Communis and avoided founding assertion of jurisdiction on the res nullius theory, preferring instead to justify the action taken on the assumption that since the continental shelf is the submerged extension of the littoral state, the latter has a reasonable right to exercise jurisdiction thereon."[98]

William Chapman describes the continental shelf proclamation as a "strategic error" that had "a disturbing effect on the law of the sea... which ... unleashed critical divisiveness among nations over this subject."[99] This observation is accurate because the Truman proclamation triggered off a rash of unilateral state claims with some latin American States making what then seemed exaggerated claims. These claims were three in nature; (a) Sovereignty over seabeds concerned with sedentary fisheries, such as pearl and oyster beds. The 1953 Australian seabed proclamation is an example; (b) Mineral resources, especially petroleum. The division of the floor of the Persian Gulf and that of the North Sea amongst the contiguous states is an example; (c) Most importantly, universal claims over the continental shelf areas, the seabed beyond them and the use of the sea above them. For example on October 29, 1945, Mexico issued a declaration laying"... claim to the whole of the continental platform or shelf adjoining its

coastline and to each and all the natural resources existing there, whether known or unknown, and is taking steps to supervise, utilize and control the closed fishing zones necessary for the conservation of the source of well-being."[100] This was followed by similar claims by Argentina, Chile, Peru, Equador, Panama, Salvador, Costa Rica, Honduras and other Latin American States.[101]

Extensive claims were also made by other nations, e.g. South Korea proclaimed its Rhee Line, the effect of which was the closure of an area of up to 250 miles from its coasts to Japanese fishermen. In 1956, the U.S.S.R. closed off the sea of Okhotsk to Japanese salmon fishermen.[102] In 1957, the U.S.S.R. also closed Peter the Great Bay to all foreign vessels and aircraft. Indonesia the same year, taking advantage of the archipelago theory, closed off her internal waters and claimed a twelve-mile territorial sea.

These series of claims were met by series of protests. The United Nations was created at this time when the law of the sea was at best a conglomeration of competing and conflicting state claims. Armed with its mandate to encourage the progressive development of international law and its codification,[103] the U.N. established the International Law Commission (I.L.C.) in 1948. In its first session in 1949, the I.L.C. initiated a study of the regime of the high seas as a matter of priority. The territorial sea was added to its study in 1952 and later all aspects of the law of the sea.

The 1958 Geneva conference, called on the recommendation of the I.L.C. led to the adoption of the following conventions dealing with nearly every aspect of the law of the sea; (a) The Convention on the Territorial sea and the contiguous zone, which retained national jurisdiction over certain areas of the sea; (b) the convention on the high seas, which provided for freedom of navigation, fishing etc. on the high seas; (c) convention on the continental shelf, which was defined as (a) the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, to a depth of 200 meters or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas; (b) to the seabed and subsoil of similar submarine areas adjacent to the coasts of islands.[104]

The coastal state was given sovereignty over its continental shelf, including exclusive rights over its natural resources which "... consists of the mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to sedentary species, that is to say, organisms which at the harvestable stage, either are unable to move except in constant physical contact with the seabed or the subsoil."[105] (d) convention on fishing and conservation of living resources of the high seas.

Despite the numerous shortcomings of the 1958 conference, it at least "... put an end to speculative and argumentative theories."[106] or more accurately it reduced the number of

contentious issues.

It however left unresolved; (a) the breadth of the territorial seas; (b) the jurisdiction of coastal states over fisheries lying in the high seas, and (c) a meaningful legal definition of the continental shelf. Consequently, some (and later most) states claimed with considerable measure of success a 200 mile limit.

By 1965, it was clear that the sea was attracting more international attention. In May 1966, the Commission to study the organization of peace issued its 17th Annual Report, and proposed that international control, ownership and administration of the high seas and seabed under the high seas be by the United Nations.[107] This was followed on December 6, 1966, by the U.N. General Assembly resolution 2176, requesting the secretary-general to make a comprehensive survey of developments in the world pertinent to the oceans and make proposals as to response. The general attitude was one of coordination and cooperation among nations. The mood of the international community was given vent by president Lyndon B. Johnson of the U.S.: "under no circumstances, we believe, must we ever allow the prospects of rich harvest and mineral wealth to create a new form of colonial competition among the maritime nations. We must be careful to avoid a race to grab and to hold the lands under the high seas. We must ensure that the deep seas and ocean bottom are, and remain, the legacy of all human beings."[108]

In February, 1967, a UNESCO, International oceanographic commission (I.O.C.), and soviet delegation meeting formally proposed that, within the I.O.C., a working group be created to draft conventions to govern scientific research on, and exploration and exploitation of mineral resources under the seas. In October 1967, the working group was created. Also in February 1967, a United States senator, Frank Church proposed that an international agreement be formulated which would confer "title on the United Nations to mineral resources on the ocean floor beyond the continental shelf."[109]

In June 1967, more than 2,000 jurists and lawyers from more than 100 countries, meeting in Geneva at the Third World Conference on World Peace Through World Law, urged the United Nations' General Assembly to assume 'jurisdiction and control' over the mineral resources of the ocean bottom.[110]

At this stage it was evident that the United Nations had become the focal point for any meaningful development of the law of the sea. Developing and new members of the U.N. were also discovering the strength in their number. The high-water mark came on August 18, 1967, when the Maltese Ambassador to the U.N., Arvid Pardo, submitted to the U.N. secretary-general a request for inclusion into the agenda of the 22nd session of the U.N. a "declaration and treaty concerning the preservation exclusively for peaceful purposes of the seabed and of the ocean floor, underlying the seas beyond the limits of present national jurisdiction, and the use of their resources in the

interest of mankind."[111]

An accompanying memorandum explained that considerable resources lay on the seabed, and could be exploited by the more technically advanced nations, and for military purposes. The memo submitted that the seabed be declared "a common heritage of mankind", beyond the reach of national appropriation. It further urged that revenues generated therefrom be used primarily to promote the development of poor countries, and that an international agency assume jurisdiction over the seabed as trustee for all countries to regulate, supervise and control all activities thereon.

The debate that followed the request "found many members surprised, uncertain, hesitant, cautious, but there were already themes and variations, some harmony, some discord, some muting and muffing."[112] When the proposal was discussed in November 1967 by the United Nations' first committee, the pattern of support and opposition was beginning to emerge. According to Eugene Brooks "Twenty-four of the forty-seven missions participating in the debate may be said to have offered varying degrees of support to Malta, while 14 missions cast a jaundiced eye at the proposal and nine were neutral ... all told a majority in favour. But the proposal ran into heavy tides of caution and reserve set in motion by the influential maritime powers, Russia and the U.S. among them, echoed by the northern European tier of nations, with the notable exception of Sweden. The U.S. failed to comment directly on the heart of

the Malta plan, an international agency, while it stress on traditional cooperation, free national uses and counsels of delay, cast a mild shadow of doubt hiding deeper hostility. Russia characteristically negative where international organization is concerned, in 1967 opposed even the formation of the ad hoc committee on oceans. The developing nations, particularly those of mideast Africa and Asia, approved an international agency and advocated a freeze on further national claims to underwater areas. Some South America nations ... Chile, Honduras and Peru ... used the debate to reiterate their claims to a 200 - mile national epicontinental zone, while supporting an international agency."[113] It soon emerged that there was a rough polarization of views between the developed nations on one hand and developing nations on the other. The developing nations certainly eyed the projected financial benefits of seabed mining, but they also feared that national appropriation would only benefit the more technologically advanced nations. Consequently they supported an international regime for the seabed.

Initially, the U.S. disagreed with the Maltese proposals because it was of the view that ocean technology was too far behind to engage in any meaningful exploitation of the seabed. It also argued that definitive rules would be premature because the world did not know enough of seabed resources.[114] The Soviet on the one hand, saw an international agency as the imposition of capitalist economic philosophy on the

international legal order, that would ensure a dictation by imperialist monopolies.[115] Furthermore, that the Common Heritage of Mankind entails holding the soviet equally responsible for colonial devastation of former colonies.

Most other developed nations were apprehensive of the tyranny of the majority commanded by developing states at the U.N.; they were not quite certain what a financially independent U.N. might become; and they also considered it just to reap and profit from their advanced ocean technology; some further considered it in their national security interests to have unrestricted access to seabed minerals.

Despite these disagreements, it was common ground that man was not taking full advantage of the resources of the oceans and that some form of international control was necessary to avoid a scramble for these resources, although the details of such an agreement were uncertain.

In 1969, the U.N. General Assembly adopted resolution 2467 (XXIII), which dealt with four issues. The highlight of which was the empowering the Secretary General to undertake a study "on the question of establishing in due time appropriate international mechinery for the exploration and exploitation of the resources in this area, and the use of these resources in the interests of mankind...."[116]

While various studies and committees of the U.N. continued meeting to find an acceptable legal regime for the seabed, the General Assembly, in 1969, at the instance of developing

countries, imposed by resolution a moratorium on seabed activities, to forestall unilateral mining activities. The resolution stated that "pending the establishment of the aforementioned international [seabed] regime: (a) states and persons, physical or juridical, are bound to refrain from all activities of exploitation of the resources of the area of the seabed and ocean floor, and the subsoil thereof beyond the limits of national jurisdiction; (b) no claim to any part of that area or its resources shall be recognised".[117]

In 1970, the General Assembly adopted the Declaration of principles governing the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction.[118] The declaration stated that the seabed under the high seas and its resources shall be treated as "the common heritage of mankind" and shall be used exclusively for peaceful purposes; that "on the basis of these principles ... an international regime applying to the area and its resources and including international machinery ... shall be established ..." and the "states shall promote international cooperation in such matters as scientific research, conservation of ocean resources, rights of other states and pollution prevention." The resolution was received with wide acceptance and was passed by an overwhelming majority.

In August 1970, the United States announced its new policy on the ocean. It essentially accepted the principle of multilateral exploitation of the seabed and the shared nature

of its resources. It however wanted a dual administrative set-up with coastal states managing the seabed within their continental shelf and an international body managing the areas beyond national jurisdiction.[119]

Thus when the U.N. law of the sea conference was convened in 1973, the concept of the Common Heritage of Mankind (CHM) has become a familiar term in the U.N.'s lexicon. The expectation was that baring few technical details the CHM would be readily acceptable to the conference. On the contrary however, the concept became the most controversial and politically divisive topic of the entire conference.

Initially, the conference proceeded slowly but steadily on compromises, concessions and trade-offs. The big maritime powers - the U.S. and U.S.S.R. wanted and got unimpeded transit passage through international straits, while the group of 77 (a collection of most African, South American and Asian states) in turn secured an international regime for the seabed beyond national jurisdiction.

At the end of the Geneva session in 1978, the expectation of most delegates, including the U.S., was that outstanding issues of the draft treaty, including those involving the seabed regime, would be resolved during the 1981 negotiating sessions in New York. Ambassador Richards, head of the U.S. delegation in 1980, was very optimistic and observed that "It is now but certain the text of a convention on the law of the sea will be ready for signature in 1981."[120] However, before

the convention could be concluded at the 10th session in New York, the Reagan administration came to power in the U.S. and announced on March 2, 1981, that it intended to prevent the conclusion of a treaty in 1981 to enable it undertake"... a thorough review which will determine our position towards the negotiations."[121] It declared after the review that there were serious defects in the final draft of the U.N. convention with regard to deep seabed mining. Despite U.S. objection, the conference went into vote and adopted the final draft by 130 votes in favour, 4 against and 17 abstentions in March 1982.[122]

Following the final vote on the U.N. Convention, the Reagan administration declared on June 29 and July 9, 1982, that "the U.S. will not sign the convention as adopted by the conference, and our participation in the remaining conference process will be at the technical level and will involve only those provisions that serve U.S. interests".[123]

Major U.S. opposition to the final draft includes, (a) The extensive powers given to the International Seabed Authority, (ISA) under UNCLOS III, including the power to regulate deep seabed mining. The U.S. wanted unrestricted access for miners to the deepsea with only limited licensing, regulation and control by the ISA. The U.S. feared that the I.S A. would become a leviation with unfettered powers and answerable to no one; (b) The U.S. also worried about the decision-making process and composition of the I.S.A. Council. It disagreed with the one - nation - one - vote assembly provided for by

UNCLOS III. It advocated voting procedures which reflect the balance of interests of participating states. This is surprising because the U.S. is virtually guaranteed a permanent seat in the council as it qualifies for membership on several grounds. Voting in the council is by consensus, which allays fears of tyranny by the majority; (c) The U.S. also objected to the review conference scheduled for every 15 to 20 years. This fear appears to have been unfounded because it would be very difficult for the convention to be amended without the approval of the U.S. or any other influential power for that matter. The review conference would proceed on the basis of consensus, and would only vote when all efforts at consensus fail. Where the review conference is unable to reach agreement on a system of exploration and exploitation of the seabed after 5 years of discussion, it may adopt amendments by a three-fourths vote, and submit such amendments to the states for ratification. Such an amendment can only come into effect after three-fourth of the state parties ratify it.[124] There exist therefore enough opportunity for the U.S. or any other nation to influence such amendments; (d) the U.S. also opposed the revenue sharing and transfer of technology provisions of the treaty. The position of the U.S. is well articulated by congressman John B. Breaux "we will not meekly submit to the new international economic order; we will not mildly consent to the ruins of our system of values as a free enterprise society."[125]

The concept of the Common Heritage of Mankind has also been dismissed by some scholars as untenable, parasitic, politically dangerous and lacking in any precise juridical content. M.I. Lazarev explains that the political danger is that "under the guise of introducing actual equality in states' international maritime relations, ... it foresees the introduction of this equality at the expense of the technologically developed states, while the developing states are essentially passive in seabed exploitation."[126] Professor Gorove is even less charitable to the concept, according to him "[T]he reference to the rather elusive and undefined concept of "Common Heritage of Mankind," no matter how well motivated in a legally binding document would be unfortunate unless it is realised from the outset that it carries no clear juridical connotation but belongs to the realm of politics, philosophy or morality and not Law".[127]

The controversy over the C.H.M. has led others to speculate on the correct regime for the deep seabed. The main propositions are: (a) that seabed mining is an aspect of the freedom of the high seas; (b) that the continental shelf convention has already appropriated it to coastal states by its exploitability provision, and (c) that the seabed is res nullius.

We shall now examine each of these propositions.

The main exponent of the freedom of the high seas argument is the United States. The U.S. demonstrated its opposition to

the CHM, by passing the Deep Seabed Hard Mineral Resources Act in 1980.[128] The Act explains in its preamble that "[I]t is the legal opinion of the U.S. that exploration for and commercial recovery of hard mineral resources of the deep seabed are freedoms of the high seas subject to a duty of reasonable regard to the interests of other states in their exercise of those and other freedoms recognized by general principles of international law.[129]

As we saw earlier, the concept of the freedom of the seas was largely the outcome of a political diatribe by Hugo Grotius, commissioned by the Dutch to eschew portuguese trade monopoly. From its inception up to the 19th century, it encompassed only the freedoms of navigation and fishing. It has been argued however that every new ocean activity made possible by scientific development, automatically becomes included and protected by the doctrine of freedom of the seas. Under this theory, the freedom of the seas would be a generic principle, accordingly every new activity would by permitted unless specifically excluded.[130] This theory draws support from the convention on the high seas (1958). Article 2 of the convention states that "the high seas being open to all nations, no state may validly purport to subject any part of them to its sovereignty." It goes further to list the freedoms envisaged by the convention as; (i) navigation; (ii) fishing; (iii) laying of submarine cables and pipelines; and (iv) freedom to fly over the high seas. It also includes other

freedoms recognized by the general principles of international law. This last portion of the article has been interpreted by proponents as enabling any new activity to be included. They cite the following comments of the international law commission, which drafted the convention: "The list of freedoms of the high seas contained in [Art. 2] is not restrictive. The commission has merely specified four of the main freedoms, but it is aware that there are other freedoms.... The commission has not made specific mention of the freedom to explore or exploit the subsoil of the high seas. It is considered that ... such exploitation has not yet assumed sufficient practical importance to justify special regulation."[131] It is of course incontestable that article 2, anticipates further developments, but it also provides that "[f]reedom of the high seas is exercised under the conditions laid down by these articles and by other rules of international law." This appears to suggest that states must give specific recognition to new freedoms not set out in article 2. Further, the convention according to its preamble, was intended "to codify the rules of international law relating to the high seas," consequently, its provision were "generally declaratory of established principles of international law." Gonzalo Biggs concludes that "..., the deliberate non inclusion of the freedom to explore or exploit the soil or subsoil of the high seas in the text of the corresponding convention for whatever reason ... confirms that it was not considered to be at that time among the established

principles of international law."[132] His conclusion is supported by the Rapporteur appointed by the International Law Association to deal with the subject of "Rights to the seabed and its subsoil," which together with the work of the International Law Commission served as a springboard to the 1958 convention on the continental shelf. He stated in 1950 that "... at the present stage of technical progress it is quite impossible to develop the seabed and its subsoil at depths greater than 200 meters. I do not see the slightest necessity for our generation to worry our heads about the legal status of technically inaccessible areas which are not capable of development and which form no part of the continental shelf."[133] It is therefore not surprising that the continental shelf convention of 1958 includes in its definition primarily the seabed and subsoil of the submarine area adjacent to the coast to a depth of 200 meters. There exist no rule of conventional or customary law which permits the exploitation of the area outside national jurisdiction in accordance with the doctrine of freedom of the seas.

Furthermore, the CHM principle is perfectly reconcilable with the doctrine of freedom of the seas, because the CHM applies to the submarine areas underlying the high seas beyond national jurisdiction. Art. 13 of the Declaration of principles governing the seabed supports this conclusion. It states that the principles of the CHM shall not affect "the legal status of the waters superjacent to the area or that of

the air space above those waters."

Finally, it maybe observed that the once unassailable doctrine of 'freedom of the seas' has fallen on bad times. Developing countries have always viewed it with suspicion, as they regard it a doctrine particularly designed to enable maritime powers move at will through the world's oceans, contrained only by reasonable regard for the rights of others. Margaret L. Dickey says the doctrine "has become a trigger phrase symbolizing the unrestrained exercise of great power by the few over the many."[134] The CHM principle was one way of ensuring that the dominance of the few and powerful is not repeated in the seabed.

A second argument is that the continental shelf convention has already appropriated the seabed to coastal states by its exploitability provision. Professor Shigeru Oda is the principal exponent of this argument. He argues that the continental shelf convention allocates all the submarine areas of the world among coastal states. He concludes that it would be necessary to first revise the 1958 convention before any international regime can be established for the seabed.[135]

As we saw earlier, the Truman proclamation of 1945 introduced the doctrine of the continental shelf. The proclamation did not however clearly define the limits of state jurisdiction. The 1958 continental shelf convention was expected to resolve the uncertainties of the law, but it merely succeeded in introducing its own ambiguities. Art. I limited

the continental shelf of a coastal state to a 200 meter depth or to a limit where the depth of the superjacent waters admits of exploitation.

The 200 meter depth provision although less controversial than the exploitability provision has been criticized as unscientific because it includes some geological non-continental shelf areas, like the Persian Gulf, within the ambit of the convention, while it excludes some geological shelf areas located outside the 200 meter limit.[136]

The exploitability provision is an "ill-defined 'rubber' boundary which defies legal or acceptable definition and which has led to dispute and expansionist national claims".[137] This is because literally read the provision will enable coastal states to claim jurisdiction over virtually all parts of the seabed since exploitation is almost now possible at all depths of the seabed. A look at the legislative history of the convention would render such literal interpretation untenable.

The convention was the only multilateral legal document dealing with the submarine areas beyond the territorial seas and underlying the high seas. At the conference, many states proposed various states limits for national jurisdiction with 200 meters carrying the day. The nations of western South America argued however, that such a 200-meter limit would be to their disadvantage because they possessed little or no continental shelf, due to the rapid descent of their submerged areas to the abyssal floor. They therefore insisted on the

inclusion of some dynamic exploitability provision which would guarantee that in future they could obtain jurisdiction over resources in offshore areas as technology to do so became available. Unfortunately the convention did not reflect this background, it merely incorporated both criteria and set them on equal footing. Despite this uncertainty, it can be argued with some credibility that the convention does not extend coastal states rights to the abyssal basins, but only to those geological structures which are appurtenant to the continents and does not include the abyssal basins. This is because the convention gives jurisdiction to the coastal state only over that seabed "adjacent" to its shores. Although adjacent is nowhere defined in the convention, its ordinary meaning connotes near or close to something. As we have seen, the idea of continquity to the landmass is central to the doctrine of continental shelf. A state must establish legal title to the land (the continental shelf). The international court of justice confirms this point in the North Sea Continental Shelf Cases.[138] It characterized the nature of the corresponding rights of the coastal state thus "... the rights of the coastal state in respect of the area of continental shelf that constitutes a natural prolongation of its land territory into and under the sea exist ipso facto and ab-initio, by virtue of its sovereignty over the land, and as an extension of it in an exercise of sovereign rights for the purpose of exploring the seabed and exploring its natural resources. In short, there is

inherent right ..."[139] It continued "The doctrine of the continental shelf is a recent instance of encroachment on maritime expanses which, during the greater part of history, appertained to no one. The contiguous zone and the continental shelf are in this respect concepts of the same kind. In both instances the principle is applied that the land dominates the sea: ... since the land is the legal source of the power which a state may exercise over territorial extensions to seaward, it must first be clearly established what features do in fact constitute such extensions. Above all is the case when what is involved is no longer areas of the sea, such as the contiguous zone, but areas of submerged land, for the legal regime of the continental shelf is that of a soil and subsoil, two words evocative of the land and not the sea."[140]

Having regard to the forgoing arguments, the continental shelf convention cannot be the basis for regulating the deep seabed.

The Res Nullius theory is next. Under this doctrine a state may acquire sovereignty over terra nullius by effective occupation, by demonstrating an intention and will to act as sovereign through a display of authority in respect of the claimed territory. It is claimed therefore that the seabed is not merely part of the sea, but a territory covered by the sea, and thus res nullius.[141] According to Sir Cecil Hurst "the subsoil beneath the bed of the open sea outside the marginal belt of territorial waters is a no man's land, property in

which can be acquired on the part of the littoral state through occupation starting from the subsoil beneath the bed of the territorial maritime belt".[142] The Deepsea Ventures' claims of 1974 can be justified under this doctrine. On November 15, 1974, Deepsea Ventures Inc., a Virginia-based subsidiary of Tenneco, Inc., filed with the Secretary of State a "Notice of Discovery and claim of Exclusive Mining Rights and Request for Diplomatic Protection and Protection of Investment". The claim expressed the claimants intent to mine a deposit of manganese nodules in an area, the coordinates of which are disclosed in the claim, encompassing 60,000 sq. kilos, to be reduced to 30,000 sq. kilos upon commencement of commercial production. The area claimed was in the northeastern Pacific ocean in depths varying between 2,300 and 5,000 meters, approximately 1,000 kilos from the nearest island and 13,000 kilos southwest of the outer edge of the nearest continental margin, that of Baja California.[143] The claim was rejected.

The credibility of the res nullius theory has been supported by the alleged existence of sufficient independent precedent of exclusive claims of littoral states to sponge and coral beds and other sedentary fisheries beyond the limits of their national jurisdiction.[144] A proper examination of this contention will reveal despite its subtlety how exceedingly unsound it is.

Before the emergence of the continental shelf doctrine in 1945, coastal states could acquire exclusive rights in

international law to sedentary oysters and corals, that lie on the ocean floor beyond their territorial seas.[145] This right was further confirmed by the 1958 continental shelf convention, which allowed coastal states to exercise sovereign rights over adjacent sedentary species as part of the continental shelf doctrine.[146] It is this recognition of coastal states' rights over sedentary species that has been put forward as evidence of the law applicable to the seabed.[147] As we contended earlier, the continental shelf doctrine cannot be applied to the seabed because it (seabed) is not the submerged natural prolongation of any coastal state. Although it could be argued with some force that at the time the law applicable to sedentary species evolved, there was no known geomorphological distinction between the continental shelf and the seabed. But as even the proponents of this argument concede, the sedentary species rights were based on historic or prescriptive rights rather than res nullius.[148] If this is correct, the sedentary rights analogy would be completely irrelevant to seabed claims, because no such historic or prescriptive claim exist on seabed mineral resources.

The res nullius doctrine has also been challenged on the ground that it rests on effective occupation of a territory. Since the seabed cannot be effectively occupied the argument goes, it cannot therefore be subject of the res nullius doctrine. This objection can no longer be feasible because it appeared to have been premised on the lack of technology to

exploit the area. In any case, occupation as a criterion for terrestial territorial acquisition has been progressively weakened. In the Legal Status of Eastern Greenland,[149] the court held that "It is impossible to read the records of the decision in cases as to territorial sovereignty without observing that in many cases the tribunal has been satisfied with very little in the way of the actual exercise of sovereignty rights, provided that the other state could not make out a superior claim. This is particularly true in cases of sovereignty over areas in thinly populated or unsettled countries."[150] Seizing on this, Waldock submits that "..., in the case of the seabed, submerged territory, it will only demand the minimum state activity which the nature of the territory calls for. On this basis, effective assumption of jurisdiction over fairly extensive areas of seabed can probably be established without necessarily showing much or even any physical activity on the seabed itself."[151]

The above argument merely begs the question as it does not prove that the doctrine is applicable to the seabed. The history of the doctrine shows that it is inapplicable. According to Oppenheim "[W]hen Grotius laid the foundations of modern international law, state territory was still, as in the Middle Ages, more or less identified with the private property of Monarch of the state."[152] Monarchs could therefore sell or transfer territory as marriage gift or otherwise dispose of same by will.[153] Thus territorial acquisition shared some

essential characteristics with private law. International law could therefore conveniently adopt the private law doctrine of res nullius. Modern international law exhibit marked differences to private law which make res nullius utterly inapplicable. For instance res nullius tend to imply total control by the acquiring state to the total exclusion of other states. Such total control would appear to run counter to modern trends in international law. As the continental shelf doctrine shows, coastal states' rights are limited to exploration and exploitation, while the international community retains other rights, such as maintenance of submarine cables and pipeline.

There is little doubt that the res nullius doctrine will introduce an unprecedented and unregulated scramble to the seabed, with very ominous implications for world peace. It cannot therefore be expected to command much respectability in modern international law, its main purpose in traditional international law was to give legal respectability to naked colonial conquest and imperial expansionist policy. These are goals which are today discredited in international law. The roundly rejection of DeepSeas Ventures' claim bears eloquent testimony to this.[154]

Our discussion reveals the inherent difficulty in determining the status of the deep seabed. "The debates are inconclusive, indeed they are largely sterile. For the most part, they are circular, with labels used to justify a

predetermined result. Writers have attempted to deduce law from general principles and by analogy but the analogies are not compelling and the general principles are not axiomatic or self-evident. At best, such law is academic and hypothetical, unsupported by practice and untested by controversy".[155]

It was the realization that exploitative conquest can no longer be the basis for man's exploitation of the sea, that led to the birth of the doctrine of the Common Heritage of Mankind. The support it received at UNCLOS III is a manifestation of the fact that a majority of states considered the seabed an undefined sui generis region. The CHM was an attempt to fill the legal vacuum. It was inevitable under this doctrine, that some sort of international organization would be established. A majority of developing nations as mentioned earlier, favoured a unitary system of exploitation conducted by a public international body and not by national or private undertaking.[156] But the developed free enterprise states insisted on a system that allowed exploitation only by national undertakings subject to an elementary system of registration or licensing[157] by an international agency. A compromise known as the "parallel system" of exploitation was therefore worked out. Under this concept exploitation would be by both the Authority and national enterprises permitted by the Authority. This system is now embodied in the final draft of UNCLOS III.

Generally, under UNCLOS III, activities in the Area would be organised and controlled by the International Seabed

Authority in accordance with the convention and the rules, regulations and procedures of the Authority.[158] Activities in the area shall be carried out: (a) by the Enterprise; and (b) in association with the Authority by state parties; or state enterprises or natural or juridical persons which possess the nationality of state parties or are effectively controlled by them or their nationals, when sponsored by such states, or any group of the forgoing which meets the requirements provided in this part [part XI] and Annex III."[159]

The International Seabed Authority (ISA) shall comprise all state parties on the basis of sovereign equality. The Authority would be financed by assessed contributions from its member states, the earnings of the enterprise, receipts from a tax scheme on seabed contractors, loans and voluntary contributions. Profits, royalties and other economic benefits derived by the Authority from seabed mining would be distributed to members on a nondiscriminatory basis.

The principal organs of the Authority would be the assembly, the council and the secretariat, although there are provisions for the establishment of such subsidiary organs as may be found necessary. The enterprise would be the commercial arm of the authority. It would carry out activities in the area directly as well as the transporting, processing and marketing of minerals recovered from the area. The enterprise shall have its own statute,[160] and enjoy autonomy in the conduct of its operations.

State enterprises and private companies or consortia may carry out activities in the area provided they accept the I.S.A.'s control for the purpose of securing compliance with the relevant provisions of the convention. Annex III, of the convention stipulates the basic standards required of applicants for seabed contracts for prospecting, exploration and exploitation. For instance applicants would have to meet financial and technical standards to be defined in advance by the council of the authority, to provide an assurance that the contract will be fulfilled in good faith and comply with the technology transfer requirements set out in the said Annex.[161] At the insistence of a number of developed states, provisions for 'pioneering status' were made to protect investments made prior to 1st January 1983, except for developing states which had until 1st January 1985. To qualify for the status, the state concerned or the certifying state must have signed the convention, and the state or enterprise must have expended before January 1st 1983 (January 1st 1985 for developing states) at least 30 million U.S. dollars in pioneer activities.[162] The main advantage of the status is that the convention guarantees the holder priority rights over all others - except for the enterprise - once the authority permits commercial production from the area.[163]

Art. 154 of the convention, empowers the assembly to undertake a general review of the practical operation of the international regime of the area and may take measures to

improve the regime every five years. A fundamental review of the system of exploitation is also to be undertaken fifteen years after the commencement of commercial production.

UNCLOS III therefore adopts the CHM principle for regulating the international area. The major criticism of this principle is that is a moral catch-phrase bereft of legal meaning and content.[164] This criticism has some merits, but this deficiency is an inevitable phase for any new concept. As Jovan Djordjevic puts it "social ownership is a process which objectively is still in the first phase of its development."[165] It would require time and practice for all the details to be filled in. Essentially, the common heritage of mankind doctrine, attempts global equity by the utilization of world resources for the benefit of mankind. It postulates that ocean policy be formulated in a way that attempts to redress imbalances in opportunities for the utilization of the seas, by States sharing in its benefits, irrespective of the vagaries of geography, geology, or relative technological development, but by virtue of membership in the family of nations. Jovan Djordjevic likens it to the concept of social property in Yugoslavian constitutional law. Under the Yugoslav theory, social property, like common heritage is non-property - the absence of property. It is the "... concretization of the old concept of the common good of mankind and thereby represents a concrete and efficient form of the internalization of certain means which appertain to mankind as a whole and over which

mankind as such - as an aggregate of equal people and countries - is the only entity to have the right to 'social control' in the full sense of that concept".[166] Consequently it is "organically tied to the concept of management, and implies the sharing of benefits and profits."[167]

Since the final draft was passed in 1982 positions of the adversaries have remained inflexible if not hardened. For as late as 1984 assistant secretary James L. Marlone said "let me state very emphatically that the U.S. cannot - and will not - sign the U.N. Convention On The Law of the Law of the Sea. The convention is fatally flawed and cannot be cured."[168] The G.77 also in 1984 proposed and secured the passage of a U.N. General Assembly resolution, reaffirming the provisions of UNCLOS III and related resolutions, and condemned any attempt to undermine it.[169] Yet as events since 1982 (when UNCLOS III's final draft was adopted) has shown, none of the sides can go it alone. UNCLOS III has not come into force because it is yet to garner the required number of ratification, and even if it were to come into force without the industrialised states, it is doubtful if the signatory states will have the capital, expertise and market for a successful seabed operation. On the other hand, the enactment of unilateral legislation by some developed states has not made any impact on seabed mining activities because private consortia are unwilling to invest in a venture with considerable legal uncertainties.

Whatever the merits of the foregoing arguments, there is

no doubt that an internationally agreed - upon rules will likely enhance universal interests in conservation, environmental preservation and rational resources management, as opposed to unilateral national actions which tend to be shortsighted, confrontational and overtly selfish. It is therefore in the interest of the world that the common heritage principle be given a chance. In the words of Ambassador William B. Jones, "..., the Authority may represent, the worst possible for U.S. involvement. Nevertheless, if all other efforts do not succeed, it may represent the only real world for the law of the sea. The opportunity to move an international organization in a favorable direction is at the moment of its creation. It would be better to get in at the beginning if we are ever to get in. Time will work against latecomers".[170]

The legal status of the Antarctic is also far from settled. The consultative parties to the Antarctical treaty do not consider the Antarctic continental shelf as an area "beyond the limits of national jurisdiction". A claim refuted by non-claimant states and the U.N.; who argue that a territory without sovereignty cannot have a continental shelf, in the legal sense of the term. Boleslaw Adam Boczek suggests that the definition of the continental shelf under Article 76 of UNCLOS III would probably apply to the Antarctic seabed.[171]

CHAPTER II

THE ENVIRONMENTAL IMPACT OF DEEP SEABED MINING

This chapter shall examine some of the potential environmental impact of deepsea mining. Before then however, it might be useful to give a brief description of some of the mining techniques being contemplated.

(A) Proposed Mining Activities

Four major stages are involved in nodule mining. They are: (i) prospecting and exploration of minable deposits; (ii) nodule retrieval; (iii) metallurgical processing; (iv) surface and transportation systems.

(i) Exploration and Prospecting

Although the two terms may sometimes overlap, exploration connotes a more detailed and costly examination of deposits identified by prospecting. Prospecting is a preliminary step to exploration, whose main purpose is to provide a general idea about what is on the ocean floor, and roughly where it is located. Exploration on the other hand is geared towards a precise determination of the location, extent and nature of the richest potentially minable deposit.

Nodule prospecting is usually done with optical television and sonar acoustical systems for scanning the ocean floor, permitting both remote and on-the-spot measuring of nodule concentration and the boundaries and continuity of the deposit. Thereafter, samples are taken

on a 100 - 200 kilos grid pattern with use of freefall grabs, spade covers, and dredges linked by cable to the research vessel. Samples collected are then analyzed and potential mine sites identified.[172]

Exploration may finally take place at locations two kilometers apart or closer. The terrain profile is indicated by a precision depth recorder mounted on the research vessel. Television cameras equipped with light covering only short distances (because of the dense blackness of the ocean bottom) are towed near the seafloor to indicate nodule concentration and total community.

(ii) Nodule Retrieval

Nodules are embedded in heavy reddish, greasy sediments or clay at the ocean bottom. Sifting them from these greasy red clays (which can be several kilometers thick) is the first stage of nodule mining operations. It follows that an efficient mining operation must collect only a minimum amount of clay - a task which is fraught with difficulty because of the rough topography of the area.

Several systems have been suggested for achieving this goal, but only two are considered viable at present. They are; (a) the continuous line bucket system (CLB); and (b) the hydraulic system.

(a) The Continuous Line Bucket System

This is one of the oldest nodule retrieval

methods. It involves the taking of nodules from the seabed at depths of 4,000 to 6,000 meters to the ocean surface. Buckets are attached at 25 to 50 meter intervals to a continuous loop of polypropylene rope and a traction machine on the surface vessel capable of moving the rope such that the buckets descend to the ocean floor along one side of the loop, skim over the bottom filling in with nodules along the bottom side of the loop and return to the surface on the third side of the loop.

The advantage of this system is its simplicity, flexibility and inexpensive operating cost.[173] Despite these advantages and the relative success displayed by the system in initial tests in 1972, it has some deficiencies. For instance, it has a low pick up rate, it collects all sediments present indiscriminately, the buckets interact with the bottom of the ocean, it is susceptible to bad weather conditions and it requires shipping huge quantities of untreated material to processing plants on shore.

(b) The hydraulic system

The shortcomings of the CLB system has shifted emphasis from it to the hydraulic system. This system is associated with Kennecott and Deepsea Ventures and has been under development since the sixties. Its basic technique is the transportation

of nodules, sediment and water from the ocean bottom mine via a nearby vertical pipe to the surface ship. A continuous flow is ensured by either; (1) an airlift pump which forces compressed air into the pipe, thus forming an expanding bubble mixture causing a pressure differential between bottom and top surfaces that provides a lifting force; or (2) a conventional pump located on the vertical pipe (optimally about 200 - 800 meters below the water surface). Nodules thus retrieved are separated from floor sediment and mixed with water to form a slurry which is pumped up to the surface faster than the nodules can fall back to the seafloor. A.M. Post estimates that a full scale system producing 5,000 to 15,000 tons per day will require a large pipe of 20 inches or more in diameter, with a lift capacity of about 4 million tons (i.e., three times the capacity of offshore drilling vessels).[174]

This system is however complicated and expensive. For example capital investments in systems being planned or under construction range from $30 to $60 million for systems capable of recovering about one million tons of nodules per year from depths as great as 18,000 feet of water.[175] It is also estimated that the average operating costs of these systems would be between $10 to $20 per ton of

nodules produced at the surface of the ocean.[176]

Other methods include, the self-propelled tractor - controlled - by - surface - ship - system, the self-contained mining vessel system, which is capable of assembling equipment at sea, but these systems are still very much in their infancy.

(iii) Metallurgical Processing

Since nodules are not hegemonous, different processing methods would be more beneficial. The method most suitable would have to be determined by the mineralogical and chemical components of the nodules.

Several methods for leaching out the desired elements from the nodules so recovered have been studied. The process chosen will ultimately determine the quality of minerals recovered. One such method is the three-metal recovery system. Ammonia which is also used for nickel recovery from land-based ores has been experimented with. It yields copper, cobalt and nickel, as well as several other minerals in smaller quantity.[177]

Another processing system is the four-metal system. This method uses hydrogen chloride. It was developed by Deepsea Ventures, and is reportedly been used successfully at a pilot plant, yielding an astonishing 98 per cent recovery of minerals, and further yields manganese as a pure metal.[178] It is also credited as capable of yielding market quantities of zinc, molybdenum and Vanadium.[179]

(iv) Surface and Transportation Systems

An important part of seabed mining is the ship mining station (or work platform) on the ocean surface. This is an intermediary process between actual retrieval of nodules and onshore processing of same.

The ship mining station must be fitted with heavy tower, and must further be serviceable in high seas and bad weather, (which is common to sub-surface oil-fields and the depth of the seabed due to the lack of intrinsic pressure). When fully developed, nodules are expected to be separated at the ship station from transport water, sediment and debris.

For a ship to serve as a mining station it must be capable of operating at 3 to 4 knots for prolonged periods, while towing the 6,000 meter pipestring through water, and at the same time providing the necessary lifting capacity.[180]

It is not clear however if sufficient amount of nodules can be economically treated on the surface ship in order to reduce the amount of bulk that must be carried to the processing plant. Such treatment would require considerable amount of energy and chemicals. Furthermore, it is estimated that slurry transport for a 3 million metric ton operation with a western pacific coast processing plant will require three transport ships to make the 5,600 km round in approximately 10 days.[181]

(B) Environmental Impact

The world's oceans covers 71 per cent of the earth's surface, that it about 361 million square kilometers.[182] It is sometimes wondered if the name earth is not a misnomer given the fact that if anything, it is more of a water planet.

The ocean plays a dominant role in the life of man. Apart from economic uses like food supply, transportation, energy and mineral resources, the ocean plays a primary role in the biological, chemical, physical cycles upon which life depends on earth. The marine ecosystem is interconnected in a web of interrelated food chains, all of which depend on the chemical situation in the ocean. Phytoplankton (tiny plants which float on the sea surface) are the base of this delicate chain. They are responsible for the primary existence of over 90 per cent of living materials in the sea, but more importantly produce by photosynthesis about 70 per cent of the oxygen on earth.[183]

It is also now well established that the earth's biosphere is a single interrelated system consisting of various functional and ecological subsystems, the disruption of anyone of which promotes the breakdown and distabilization of the others. Yet the oceans have for centuries been a receptacle for waste dumping. The volume of dumping has increased considerably with technological development, which has consequently reduced the capacity of the oceans to balance the global ecosystem. At an era when man has polluted the oceans with oil, pesticides, heavy metals, poison gas, sewage,

radioactive waste, etc., any new activity in the ocean must be given an environmental clean bill of health before commencement.

What exactly amounts to marine pollution? Although 'marine pollution' has become an environmental catch-phrase, it does not lend itself to an easy definition, because far from being a single, precisely determined, biological, chemical and physical process, it may in fact take any of these forms, while the exact chain of cause and effect may require a very complex scientific inquiry.

United Nations experts however define it as 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, hinderance to marine activities including fishing, impairment of quality for use of sea water and reduction of amenities."[184] Essentially pollution may be used in two senses, (a) to indicate any alteration in a given environment and (b) to indicate a threshold level of damage or interference which is legally significant.

The environmental impact of deepsea mining discussed below are largely speculative because commercial mining is yet to begin. The U.S. National Oceanic and Atmospheric Administration (NOAA) states that no significant environmental consequences are foreseen as a result of exploratory mining

activities.[185] It should be noted that this conclusion was based on a short testing period with the longest being two days.[186] The report however concedes that mining at a commercial recovery stage may have "significant adverse impact."[187]

Some scholars have also seized upon the conjectural nature of the environmental impact of seabed mining and have dismissed it as negligeable or non-existent.[188] They even proffer some environmental benefits for the terrestial environment. J. Mero argues that "[f]ull-scale development of these deposits as a source of industrial metals will allow society to close many of the sulphide mines on land which are presently a substantial source of air and land pollution...."[189] Apart from the danger of extrapolating the results of limited exploratory tests to commercial mining, it is foolhardy to dismiss as insignificant the environmental implications of deepsea mining simply because they are unknown. A careful consideration of the potential environmental hazards of deep seabed mining however, would show that there are potential hazards and claims to the contrary are unfounded.

(i) Nodule Retrieval

It is conceded that the removal of nodules will not produce so gross a disturbance as most kinds of terrestial mining will occasion, since the dredge heads will cut only a few centimeters into the ocean floor.[190] This does not mean that the harm to the environment can be

discountenanced. The surface of the seabed and water column, especially the upper layers would be affected by mining operations. How serious such operations affect the environment would depend on the characteristics of the particular operation. The release of sedimentary material at various points of the water column and destruction of marine life are almost inescapable. Beneficiation or nodule processing would further compound the effects.

The retrieval of nodules will be carried out by scraping the ocean floor with buckets or by use of a pumping system. This may result in the destruction of macrobenthic organisms in the part of the mining machine.[191] Although the depths at which minable nodules occur and the water column above such nodules, are typified by low biological activity,[192] and so only a small fraction of the marine fauna biomass is potentially affected by the dredged heads,[193] it does not mean that the deepsea is barren. It is the habitat of numerous animals, including echinoderms, coelenterates, molluscs, and sponges.[194] At present only very little is known of these organisms, it has however been suggested that they are important because they modify the physical and chemical properties of sediments.[195] The ability of these organisms to repopulate dredged areas is uncertain, since some of the species have extremely slow reproductive cycles.[196] For example, Tindavid Callistiform, a benthic

clam requires 200 years to reach sexual maturity.[197]

The effect of seabed mining on the microbenthos is also uncertain. Benthic bacteria play an important role in the food chain by releasing plant nutrients back into the system and converting detritus and dissolving organic matter into a particulate form that can be utilized by larger organisms.[198] This bacteria activity accounts for the high nutrient level of deep ocean waters; the world's great fisheries are located wherever these waters, through the process of upwelling, rise to the surface.[199]

Nodules being themselves habitat for various protozoans and other microbes, mining would no doubt affect benthic bacteria that inhabit them.[200] This is very important because microbes appear to play a significant role in the development of nodules. This takes place by bacteria oxidizing manganous ion to an insoluble tetravalent state, which ion then precipitates onto the growing nodule; the resultant manganese oxide then acts as a scavenger, attracting other cationic components of nodules, such as iron, copper, cobalt and nickel, which are known to absorb strongly on manganese oxide.[201]

Although the effect of intervention in this natural process is largely speculative, it has been suggested that nodule mining may result in an ecological unbalance as a result of large-scale nodule mining. "If we visualize

nodules as exerting an important control on the concentration of heavy metals in sea water at the water sediment interface ..., then their removal is likely to result in abnormal rise in heavy metal concentration."[202]

A more serious environmental concern is the discharge of sediments into the ocean during the mining process. As we remarked earlier nodules are generally located in the ocean bottom. Retrieving them will entail stirring up and transporting some of these sediments along. When nodules are received on board the mining ships, the sediments from the ocean floor and nodule fragments will be discharged back into the ocean. It is estimated that a mining ship which recovers 5,500 tons of ocean sediments per day will discharge roughly 2,200 tons of solids and 2,96 million cubic feet of water back into the sea each operating day.[203] These red clay sediments will form a dark "plume" over large areas of the ocean's surface because red clay is extremely fine-grained: it is the finest of all ocean sediments with over 80 per cent of its particles having a fundamental particle size of less than 30 microns in diameter.[204] In its fundamental size, the sediments can remain in suspension for a very long time. It is estimated that plumes so created will settle slowly and could take five years to settle 100 yards downward.[205] If extensive mining activities are carried out it could turn the blue sea to reddish brown for tens of thousands of

miles. The concern is not limited to this aesthetic distortion but other more serious consequences.

The upper layers of the water column (known as the euphotic zone) will be seriously affected by these sediments. This is because the mixing of deep-ocean water and sediments with surface water may cause a stimulation of phytoplankton and blooms of other organisms, which do not normally occur in the pelagic zone where manganese nodules are concentrated. This stimulation of phytoplankton growth is suspected to be the result of increased concentrations of trace elements or release of sediment associated vitamins.[206] Increased phytoplankton growth could increase bacteria growth in the euphotic zone resulting in decreased oxygen level.[207] Sedimentary discharges could also fundamentally disturb the entire food chain, by interfering with light penetration in the euphotic zone and so adversely affect photosynthesis.[208] Sunlight penetrates only about a 100 meters of the water column, where solar energy is harnessed by plants through photosynthesis to begin the marine food cycle. This process is the livewire of all other marine life. Sediments would reduce light penetration and slow down this process. The pycnocline layer (that is the layer which separates the well-mixed surface waters from the dense waters of the deep ocean) would consequently shift maximum light to the euphotic zone above. This would

leave the pycnocline layer poorer in light, which will be critical, because it is already poor in nutrient and would consequently produce less biota.[209]

Dredging typically disturbs the ocean bottom and would create turbidity, which would seriously affect the Benthic population. The Benthos on the site would be destroyed and communities at some distances surrounding the dredging operation would undergo siltation, especially down current from the mining site. As material stirred up by dredging is heavier than water, it is not expected that it would rise much above the dredging site, in the absence of strong vertical currents. Nevertheless, convection currents created by the dredging operation or normal upwelling could cause the lighter suspended faction to rise. Turbidity could consequently be increased in the euphotic zone, causing reduced basic productivity. It has been argued however that disturbance of sediments by natural oceanographic phenomena as turbidity currents and upwellings, as well as slumping along continental margins and on highlands within ocean basins. takes place on a much larger scale than would result from seabed mining.[210] Further, that because natural disturbance takes place at specific locality, e.g. at the mouths of rivers and along the coasts,[211] where mining activities are not likely to take place, the effect of these forces in mining areas is negligeable. However, it has been pointed out that "The

significance of the human intervention is that an aggressive exploitation of the ocean floor may process indiscriminately, largely parts of the ocean basin whereas the natural processes are not uniformly disturbed in intensity or frequency. The biological consequences of the latter are known empirically to be capable of accommodation by the deep ocean life, but there is serious concern about the former's effect...."[212]

The exposure of sediments to oxygenation will affect their potential, and may further lead to leaching by certain elements, e.g. phosphorous. Heavy metal ions might also be leached from sediments carried to the surface. These elements can be concentrated by aquatic organisms to levels dangerous for human consumption. Furthermore, studies show that zooplankton ingest fine particles in the plume as it settles.[213] Since larger organisms feed on the smaller ones, trace metals such as tuna, present a potential hazard to human health.[214]

Particulate matter in the plume reflect and scatter sound, thereby possibly interfering with communication among marine animals, including whales.[215] This may be more serious for lives in the ocean bottom who hitherto have led a relatively undisturbed existence.

Nodule formation process is very slow, about one tenthousandth of a millimetre per 1,000 years.[216] Unregulated mining might destroy this process and the

possibility of understanding the entire process of nodule growth.

A far although, not altogether bizarre possibility is suggested by Richard A. Frank; "The ocean bottom is essentially a self-contained unit, its life does not mingle with the rest of the earth. Deepsea mining will bring up from that unknown world large amounts of ancient spores and organisms which may have created strange, alien antibodies which continue to survive. Scientists simply are unaware of what will happen when any such antibodies are set free in the new environment. It is possible that they will infest plant life or humans and we will not have cures".[217] The reverse could also be true, man, being a foreign life form in the ocean bottom, could bring bacteria viruses and fungi, his equipment could also bring spores and other organisms, many of which could be preserved and later become part of the marine biota.

(ii) Processing and Waste Disposal

As we saw earlier, valuable minerals would have to be leached out of the nodules recovered. Ammonia and hydrogen chloride are presently favoured for the beneficiation process. If processing takes place at sea, (Which is almost a certainty because of its economic advantage) highly pollutive chemicals with heavy alkaline and acid employed in such processing would be dumped most probably into the sea. A considerable number of such

dumpings could turn the sea into "maritime equivalents of slag heaps, causing considerable ecological change and deleteriously affecting the food web."[218]

Nodule processing will generate a considerable volume of waste, as only one-third of the nodule is commercially useful at this time. One three-metal processing plant with an annual input of three million tons could produce ninety-nine and half tons of waste per year.[219] If stored on land, the waste from a three-metal plant would cover 610 acres per year if placed in a compacted layer three feet thick.[220] According to Hope Robertson, no known safe tailings disposal method exist.[221]

The committee on Marine Science Engineering and Resources has warned that "... [u]nwise dumping of the tailings, if not carefully planned, could quickly foul a mining operation. Furthermore, the compatibility of a marine mining operation with exploration of other resources of the sea, particularly the food resources, will depend principally on the effectiveness of the tailings - disposal system."[222]

The environmental effects discussed above result from deliberate or conscious activities. Accidents during mining operations could further compound these effects. The ocean bottom is rough and difficult to chart, complete with series of mountains. The water columns above are stormy, with deep troughs and fast variable ocean

currents. All these make the chances of accidents very likely. Experience on the continental shelf reveals that blow-outs occur frequently. Between 1954 and 1969, 25 blowouts were recorded in the United States alone.[223] Mining such a hostile terrain would require adequate safety standards and equipments.

It is evident from our discussion that the environmental aspect of deepsea mining is littered with a number of unanswered questions yet the world community influenced solely by economic considerations has largely pressed for immediate exploitation without adequately addressing these questions. This is not surprising. Marine environmental issues usually take the backbench for two principal reasons; (a) it does not usually elicit immediate protests as land-based environmental issues due perhaps to the lack of resident constituency so traditional in land-based situations. On the other hand, marine polluters are usually well organised power brokers. For instance, seabed mining requires large capital backing and a tightly organised corporate structure, consequently, a few well financed ocean industries may be able to attain an essentially high level of influence and visibility in ocean management decisions; (b) the ocean environment is resilient and has been largely perceived as having an inexhaustible capacity for withstanding abuse. It is true that the ocean can cope with a limited amount of pollution

through a self-cleansing process, but this process has been so overwhelmed and slowed considerably that it is now almost non-existent. According to Knauss, "The resident time concept has little meaning for a particle of water in the ocean ... There is no flow-through in the ocean in the usual sense ... generally speaking, the pollutants do not evaporate. They remain in the ocean until such time as they are degraded or sink to the bottom".[224] Consequently once a pollutant enters the ocean it stays polluted for a considerable length of time. The message is well put by L.F.E. Goldie: "to many the oceans are the ultimate repository of all pollutants. The oceans ability to assimilate waste material is immense; for every person on earth there is the equivalent ocean volume of one square mile, 500 feet thick. But the oceans are not infinite, and they must not be considered the ultimate solution for waste disposal problems".[225]

Perhaps environmentalists in the past unwittingly contributed to this state of affairs. They were principally concerned with domestic environmental matters. Recent developments have shown that the environmental crisis is a global phenomenon which requires concerted global efforts. The complex web of fragile interrelationship and interdependence which characterize living and non-living systems on earth; the fact that damage to one link in the ecological chain is significant

to the whole system; and the effect of the cumulative consequences of seemingly insignificant events, are slowly been understood. The ocean is not an isolated environment, but a fundamental and integral part of the planetary life-support system. Sustaining its vitality through rational and regulated use is therefore imperative.

It is possible to conduct deepsea mining with minimum environmental damage provided it is "conducted intelligently."[226] Ensuring intelligent and rational exploitation, will demand further research and a law that takes into consideration the type of techniques, equipment and chemicals to be used, the topography of the area, the skill, care and training of personnel involved.

CHAPTER III

LEGAL CONTROLS

International environmental law like any other plays a normative role, which involves the articulation of policy reflecting communual expectations. Although the law of the sea is of considerable antiquity the environmental law of the sea is relatively new in the international legal order. A strictly positivist approach with emphasis on precise, clearly established, firmly sanctioned, obligatory rules, based on universal consent of national states, would lead to a conclusion that the environmental law of the sea is very recent and still in most cases tentative.

A naturalist approach on the other hand which relies on natural order, human reason and moral authority would be more beneficial, because it could support the view that the roots of international environmental law are buried in the classical principles of the international legal order. There is no doubt however, that international environmental law as a concise body of law is still very much in its infancy. Its emergence in the 19/0's was largely due to some of these factors; (a) a sudden realization by man that the quality of the environment was progressively deteriorating as an aftermath of scientific and technological developments, which made wanton and aggressive exploitation of the planet's resources possible; (b) an increased ecological perspective to the world i.e., an awareness of the complex web of interdependent phenomena which

related environmental features to man as a social being; and (c) the increasing incidence of transboundary pollution.

The major sources of international law are conventions in form of multilateral or bilateral agreements and customary behaviour. While treaties and conventions are not free of controversies, they are less burdensome than customary law, whose scope is in most cases seriously disputed. The problem is doubly so in environmental matters, especially in a largely uncharted area as the deep seabed. This is due to the fact that the seabed was until recently outside the sphere of active use, consequently no rules were specifically designed for it. In this chapter therefore, we shall discuss a variety of environmental rules and evaluate their relevance (if any) to the seabed. The bottomline however, is that most of these rules were not designed for the seabed and applying them to it is at best conjectural.

As remarked at the beginning of this work, we are primarily concerned with the seabed outside national jurisdiction. The seabed subject to national jurisdiction is regulated by the 1958 convention on the continental shelf. Article 5(1) provides that the exploration of the continental shelf and exploitation of its natural resources must not result in any unjustifiable interference with navigation, fishing or the conservation of the living resources of the sea. Further, the coastal state is obliged to take "all appropriate measures for the protection of living resources of the sea from harmful

agents".[227] We shall therefore assume that coastal states have in place national laws regulating mineral exploitation in their seabed and subsoil. The adequacy or otherwise of such regulations is outside the scope of this work. However, a glimpse at their nature may be seen through the eyes of the permanent representative of Norway, who while speaking at the first committee meeting of the twenty-fourth session of the General Assembly, wondered whether as regards the international area, the international community would be satisfied "with certain lax approaches used today in oil drilling by various countries to the effect that the more or less haphazard work manuals of a drilling platform are accepted as the only safety code and anti-pollution code applicable to the oceans of the world."[228]

(A) Customary International Law

Customary international law maybe cynically described as what a nation can get away with. All it needs to do is stake a claim and see what happens. Widespread support or ineffective opposition may create a new norm of customary law. It consists of two distinct elements general practice and its acceptance as law by the community of nations.

Transnational environmental hazard in customary international law is seen through a twin perceptive - territorial sovereignty and non-interference. Firstly, a state has sovereignty within its boundaries, a quality which confers the right to conduct activities not per se illegal within its

own territory. Secondly, sovereignty also implies freedom from outside interferences and externally caused harm. Sovereignty in this regard is more of an atomistic concept at war with itself, because the exercise of exclusive sovereign rights by one state may be at variance with the claims of another state to rights in its own territory of the same character. To ensure some form of order there had to be reciprocally operating limitations. GÜnther Handl explains that "This rejection of the absolute view of sovereignty was an acknowledgment of the fact that activity within a state's territorial bounds ceased to be within the exclusive competence of that state and became instead a matter of international concern if such action caused transnational effects".[229] Invariably, decisions hinge on whether a transnational risk is of such a magnitude as to override the sovereign claim of the risk-creating state.

(i) International Judicial and Arbitral Decisions

Current customary international law has been shaped to a considerable extent by the following few cases.

The Trail Smelter Arbitration (.U.S. v Canada).[230];

Sulpher dioxide fumes from the plant of a private corporation located in Trail, British Columbia, were causing damage to privately owned agricultural and timber land in the state of Washington. The main question for determination was whether the Trail Smelter should be require to refrain from causing damage in the state of

Washington in the future and, if so, to what extent. The tribunal found that the Smelter's operation during certain periods of the year resulted in inevitable transfrontier pollution because of the particular meteorological and topographical characteristics of the location.[231] It concluded that "no state has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another state or the properties or person therein, when the case is of serious consequence and the injury is established by clear and convincing evidence".[232]

To support its conclusion that a state has a duty to protect other states against injurious acts by its citizens, the tribunal relied on a swiss case Aargau v Solothurn.[233] This case involved a dispute between two Swiss firms. The issue was whether one canton was entitled to absolute protection from trans-border risks emanating from a riffle range in the adjacent canton. No allegation of actual damage was made, the suit was therefore a preventive measure against future risk created by target practice in the border area. The risk-exposed canton justified its claim on the ground that injuries caused to its citizens by the operation of the range would be inconsistent with its territorial sovereignty. The claim was rejected by the swiss federal court. The court conceded however the possibility established by clear and

convincing evidence, that continued use of the range could result in stray bullets crossing into the neighboring canton's territory and causing damage and injury therein. This decision which was ostensibly approved by the Trail Smelter tribunal indicate that risk creation alone, will not of itself warrant prohibition of the activity. 'GÜnter Handl[234] concludes that the decision is authority for the proposition that mere conduct of a hazardous activity involving a transnational risk might not necessarily be viewed as an injurious act that the risk-creating state would be obliged to prevent under international law. This conclusion as conceded by the author is speculative and its implications for transnational pollution ambiguous. In fact, when the Swiss case first came to court as Solothurn v Aargau,[235] the court upheld the plaintiff's sovereignty-based claim to complete protection from the risks associated with target practice in the neighboring canton's border area, basing its decision on international law. It was only when the case returned to court a second time that it declined to prohibit continued operation of the range, on the ground that if in spite of the additional measures, the extremely small probability of stray bullets could not be eliminated, then the continued use of the range entailed a "practically inevitable, in a sense natural risk, one that neighbors had to live with."[236]

The second swiss decision, relied heavily upon by Trail Smelter, should be seen in its proper context. Between the first and second decisions, a federal legislation was passed compelling local communities to provide target practice facilities for the military. As absolutely safe practice facilities in the community concerned was unavailable, the court found that the neighboring canton's demand for absolute protection against transboundary crossing of bullets was in conflict with implementation of the federal laws. This decision subjected the sovereignty of the canton to the overriding superiority of the federal law. Giving these, circumstances, the second swiss decision may actually have less significance than was placed on it by the smelter tribunal.

The Trail Smelter decision however suggests that to ground liability the following elements must be present; (i) that the activity cause actual injury to another state's interests; (ii) that tne injury be a serious one; (iii) that the causal relationship between the injury and the activity be proven by clear and convincing evidence. We shall further explore the implications of some of these conclusions later in this work.

Another important decision is the Corfu Channel Case.[237] Here two British warships passing through the Corfu Strait in Albanian Territorial waters in 1946 struck

a minefield resulting in a large number of deaths and personal injuries to the British sea men, as well as substantial destruction of one vessel and serious damage to the other. Albania had not itself laid the mines, and the facts from which its knowledge of the minefield's existence was ultimately inferred were in dispute. Albania did not warn British vessels of the existence of the minefield. The international court of justice decided in favour of Britain holding that every state had an obligation "not to allow knowingly it territory to be used for acts contrary to the rights of other states."[238]

This case has been cited as authority for the proposition that international law imposes upon states an obligation not to permit transnational environmental injury.[239] However, as S.A. Bleicher points out the case may be less significant than it has been held out to be.[240] Firstly, the court was primarily concerned with other matters such as proofs and presumptions, the scope of the right of innocent passage of warships, and the jurisdiction of the court to fix the amount of compensation under the language of the compromis. Secondly and more importantly, this was not a typical transnational environmental injury case. The activity and resultant injury took place within Albanian territory thus bringing it closer to injuries to aliens than transnational environmental problems. Thirdly, the injury

was not a by-product of an economically useful activity, "but the intended result of the symbolic and actual collision of two military machines.[241]

Despite these observations, this case is important to international environmental law because it can be used effectively to rebut states claim to ignorance of the existence of a continuous source of pollution in their territory.

The Lake Lanoux case[242] while not necessarily advancing our discussion reinforces some of the points made above. The dispute concerned the diversion of waters of an international river, by France, the upper riparian, and was challenged by Spain the down stream state. Spain argued that its rights to the waters of the carol river, as guaranteed by a treaty, would be jeopardized by the construction of a power project planned by the upper riparian France. The court held that "It had not been clearly affirmed that the proposed works would entail an abnormal risk in neighborly relations or in the utilization of the waters". It may be concluded from the passage that an abnormal risk would be a breach of international law.

The Nuclear Test cases,[243] between Australia and New Zealand, on one hand and France on the other, presented the International Court of Justice, a unique opportunity to define the exact scope of state responsibility in

international environmental law. It failed to seize the opportunity.

The plaintiffs sought amongst other things a declaratory judgment regarding the legality of French atmospheric testing. Despite a formidable dissent,[244] the court declined to reach a conclusion on the merits, holding that the controversy has become moot by the French unilateral declaration of intent to discontinue such tests.

The implications of these decisions for transnational pollution hazards are ambiguous. They provide no clear guidelines but merely indicate an awareness and concern for the problem, but offer no precise solution. For instance, it is not clear whether a state is responsible for individual activities for which it has no control. Some scholars argue that since a state claims absolute jurisdiction over everything that takes place in its territory, it follows that it should be absolutely responsible for every activity taking place therein which causes injury, directly or indirectly to another state.[245] The Trail Smelter case lends credence to this contention. The tribunal in this case held a state (Canada) responsible for private activities in its territory. The tribunal did not articulate the reasons for its conclusions, it merely stated that "considering the circumstances of the case, the tribunal holds that the

Dominion of Canada is responsible in international law for the conduct of the Trail Smelter. Apart from the undertakings in the convention, it is, therefore, the duty of the Government of the Dominion of Canada to see to it that this conduct shall be in conformity with the obligation of the Dominion under international law as herein determined."[246]

The tribunal sought to rely on a U.S. Supreme Court case, Georgia v Tennessee Copper Co.,[247] to justify its conclusion. This case however involved a private source of pollution, and although the suit was brought by the state of Georgia as plaintiff, the relief was granted directly against the polluter, not against the state of Tennessee. The Supreme Court in the Georgia case was mainly concerned with the rights of the state of Georgia as a plaintiff, although the injuries were against its citizens, in its capacity as a quasi-sovereign.

In the particular circumstances of the Trail Smelter case, the result may have been reasonable. According to John E. Read, then legal Advisor to the Secretary of State for External Affairs of Canada, "[T]he U.S. government intervened, through diplomatic channels in 1927. The subject-matter of the dispute did not directly concern the two governments; nor did it involve claims by U.S. citizens against the Canadian government. It did not seem to come within any of the ordinary categories of

arbitrable international disputes. It consisted rather of claims based on nuisance, alleged to have been committed by a Canadian corporation and to have caused damage to U.S. citizens and property in the state of Washington. Nevertheless, when the U.S. proposed to refer the questions at issue to the international Joint Commission, the Canadian government concurred".[248] This is therefore a case where both governments became parties to the dispute by choice. It may not be a good authority for non-consensual situations. Although the tribunal was willing to hold Canada liable "Apart from the undertakings in the convention",[249] it is doubtful whether such a rule can be supported in international law.

State responsibility was initially restricted to mistreatment of Aliens, before it was expanded to include a broad range of situations under which international obligations may be incurred. The principle has always been that a state is only liable for acts of its citizens if; (a) it directly participates in the offending act; or (b) it fails to take appropriate measures to prevent the injury to other states. According to professor O'Connell "... there must have been state participation in the act before there can be state responsibility for it".[250] Consequently, although the Trail Smelter case suggests that a state is responsible for acts of private tortfeasors, the better view is that a state is not

responsible, although responsibility may be imputed or transferred to it, if it had knowledge of pollution emanating from its territory or has neglected its duty of supervising the activity.

The Trail Smelter decision is however still important for these propositions: (a) no state may use or permit the use of its territory so as to cause serious transnational injury; (b) this rule is imposed even though the source of the injury is under private management. In this regard the rule is stricter than the law protecting aliens.

It may be argued that these cases in fact are of no relevance at all for pollution hazards in areas outside national jurisdiction. The Trail Smelter case for instance involved the use of one territory causing damage in adjoining territory. While pollution in deep seabed outside national jurisdiction will not necessarily concern events occurring within the respondents state's territory nor damage uniquely suffered within the territory of another state. In principle however, there appears to be no reason why a state's responsibility should differ from that enaciated in Trail Smelter simply because the event occurred outside national boundaries. For instance although article II of the outer space treaty declares outspace outside the reach of national appropriation, it essentially bases legal responsibility on the Trail Smelter principle. Article VII of the treaty provides

that states are responsible for damages caused to other states by their activities in outer space. Articles 194 and 198 of UNCLOS III, restate this principle. What need change with regard to the seabed are the parties, instead of a state party, the body responsible for the international area, e.g. the International seabed Authority is substituted.

(ii) State Practice

Art. 38 of the statute of the I.C.J. recognizes state practice as a source of law formation. Professor McDougal defines it as the "process of continuous interaction, of continuous demand and response".[251] The difficulty in this regard is determining when a state practice coalesces from mere evidence of the process of formation of custom to evidence of the existence of such a custom. The problem is not made easier by the fact that states are both the creators and addressees of norms in international law. The opinio juris helps to draw the line. Opinio Juris is "the belief that this practice is rendered obligatory by the existence of a rule of law requiring it".[252] Again this is not a prior talisman. States act for a myriad of reasons which might not include a belief of legal obligation. In relatively few cases, international resolutions or declaration of principles may reflect the views of a vast majority of states on a particular issue and thus the opinio juris. However in a

vast number of cases such clear-cut resolutions are absent. In which case a custom maybe formed either; (a) by a neighboring state objecting during or after the initiation of the hazardous activity in the frontier area; or (b) a state may abstain from conduct of an abnormally dangerous activity in frontier areas in anticipation of diplomatic protests by the neighboring states. It is easier to determine the existence or non-existence of a rule by the response of states than where they merely abstain from acting. This is because abstinence can be ambiguously interpreted as it could result from considerations other than the anticipated reaction from other states. The I.C.J. has recognized this point and ruled that mere abstention without a careful consideration of alternative reasons for it, is an insufficient proof of the existence of an international legal custom requiring abstention.[253]

Kirgis volunteers a formula for determining this rather tricky issue. According to him "If freedom of action might plausibly be asserted, and if purely selfish interests would normally be served by action (or by less restraint than is observed), inaction or restrained activity is legally significant".[254] We shall now consider some examples of state practice.

In 1892, French troops staged target practice exercises near the Swiss border. Switzerland protested

the danger to a nearby Swiss community. The French stopped the exercises until accidental transnational injuries could be avoided.[255]

An explosion occurred in a munitions factory at Arcisate, Italy, five kilometers from the Italian-Swiss border in 1948, causing varying degrees of damage in several Swiss communities. The Swiss contended that Italy was liable because it tolerated the existence of an explosives factory as well as its attendant hazards in an international border.[256] It appears the claim was never settled, but it is significant because Switzerland based its claim on the fact that, the conduct of abnormally dangerous activities in frontier areas was per se violative of international law.

In 1976, France protested blasting operations in a private quarry on the Swiss side of the river Doubs near the community of Le Noirmont.[257] The river borders Switzerland and France in this area. The claim appeared not to have been based on actual damages, but on future risk to the whole area and to inhabitants from landslides caused by blasting. The Swiss terminated the hazardous activity, an action suggestive of a recognition of international legal implications of industrial activities creating transnational risks. It must be noted however that the blasting activities were illegal under Swiss law.

Supertanker traffic is a good example of the action

and reaction process of international law. The U.S. and Canada were engaged in a dispute over the use of Canadian waters as a route for supertankers serving a proposed refinery in Eastport, Maine. The only access route was a channel between two Canadian islands and hence through Canadian territorial waters. The Canadian government argued that the potential grounding or collision of a supertanker represented "an unacceptable environmental risk".[258] That is, because of the potentially disastrous environmental consequences of a major oil spill, Canada could lawfully prohibit U.S. - bound supertanker traffic through the channel. Canada appears here to rely on the doctrine of innocent passage, which confers considerable discretion on [illegible]stal state through its territorial waters.[259]

The U.S. on the other hand regarded the route to Eastport as subject to international straits regime.[260] Art. 16(3) of the 1958 convention on territorial seas, defines a strait as channels "used for international navigation between one part of the high seas and another part of the high seas or the territorial sea of a friendly state".[261] Under the latter argument Canada could only suspend the rights of passage if navigation through the strait were not innocent.[262] Consequently Canada under this theory would have to show the reasonableness of the restriction based on the potential risk of environmental

pollution. Reasonableness here would be influenced by such factors as; (a) Whether vital national interests of the strait state are at stake; (b) the impact of this action on the flag state's interests; and (c) the precedential implications for world maritime commercial traffic.[263]

Although the issue did not eventually go to arbitration, the Canadian position is significant to international environmental law because it is essentially an effect argument, under which an activity whose conduct would ordinarily be a matter of discretion of a state, become a matter of international concern if the activity affects significantly another state's interest.

The U.S. government was greeted with a plethora of protests in 1971 when it planned a second underground nuclear test in Amchitica, one of the Aleutian islands. The Canadian and Japanese governments protested against the proposed tests. The Canadian government feared that the tests might produce a major earthquake, tidal waves or leakage of radioactive materials into the environment, or a combination of these results. Both Japan and Canada reserve their rights to compensation in the event of damage.

The U.S. government in response assured the Canadian government that "the interests of Canada would be taken into full account and careful consideration given to the

possible impact of the physical environment on and around Amchitica Islands".[264] The relevance of this incident to our inquiry is that neither Japan nor Canada questioned the legality of the tests. In fact the Canadian Secretary of State for External Affairs stated in parliament that "... in the end the U.S. government has the legal right to carry out this test. It presumably is doing so in accordance with what it perceives to be the national interest of the U.S.A.".[265]

In 1949, Austria protested the existence of minefields in Hungarian territory close to the border with Austria. Those mines were laid by the Hungarians apparently to prevent clandestine passage of persons across the frontier.[266] The Austrians expressed fear that a flood would sweep the mines into their territory and endanger its citizens living near the border. Austria's fears were confirmed when a Hungarian contact mine crossed the border and exploded, causing extensive damage in its wake. The Austrians lodged a strong protests with the Hungarians for violating the "uncontested international legal principle according to which measures taken in the territory of one state must not endanger the lives, health, and property of citizens of another state".[267]

A second incident followed soon thereafter and Austria charged that the absence of a public committment by the Hungarian government to take all measures to

prevent such accidents in the future was "totally inconsistent with the principle of good neighborliness".[268]

The Austrian contention clearly emphasizes that the creation of a transnational harm of a severe nature was contrary to international law. It is instructive to note that Hungary removed all the mines from the frontier.[269]

State practice also points to the existence of the right of self-defence, self-preservation and security. A state confronted with a major threat is not expected to be passive and watch an environmental disaster unfold, but is permitted to exert the 'necessary and proportional' force to avert the danger or abate its effects. This rule also enables a state to protect itself from actual or potential danger from injurious use of inclusive resources. A vivid example is the 'Torrey Canyon' incident. In March 1967, the 'Torrey Canyon' struck a reef while carrying 880,000 barrels of crude oil, spilling most of its cargo. In three days the spill had covered an area over thirty-five miles long and eighteen miles wide. Carried along by the wind, the thick blanket of crude oil spread towards some of the best resort beaches and fishing areas in the United Kingdom. After an unsuccessful attempt by the salvors to refloat the vessels, the Royal Air Force bombed her to ignite the oil remaining with hulk so that it would burn rather than leak out into the sea.[270]

Self-defence although a useful tool for environmental protection has limited application because of the strict conditions for its exercises. For example, the act of self-defence must be proportionate to the danger being abated, there must be no other reasonable alternative and it appears to be restricted to unlawful activities.[271] It is further held in suspect because of the possibility of abuse by states.

State practice as a law making process of international law has been dismissed as irrelevant because of; (a) the upsurge of multilateral agreements in environmental matters; (b) the increased use of the United Nations forum for environmental resolutions, declarations and conventions; and (c) that unilateral action raises potential problem of a 'patchwork quilt' of competing standards and criteria.

However, state practice remains a legitimate and essential means open to states for the progressive development of international law. As J. Schneider explains "... there is no stark dichotomy in fact and that it makes little sense to juxtapose 'unilateralism' as competing alternative international approaches. International law making proceeds simultaneously at all these levels, and the validity of particular outcomes must be judged not only by their compatibility with established norms and standards but also in advance of formalized

legal processes".[272]

A trend common to both aspects of customary international law just discussed is that transborder pollution or hazard appears to be based on the concept of "good neighborliness" or abuse of rights. This concept implies that the exercise of territorial rights, cannot be separated from the social context in which the rights are being asserted and that it is only in the concrete circumstances of a specific situation that rights may find their exact delimitation.[273] It follows therefore that since the exercise of a sovereign right is bound to conflict with similar claims, insistence on individual rights must be considered unreasonable and reprehensible. According to the PICJ in the International Commission of the River Oda case,[274] "[A] community of interest in a navigable river [that traverses or separates the territory of more than one state] becomes the basis of a common legal right, the essential features of which are the perfect equality of all riparian states in the use of the whole course of the river and the exclusion of any preference privilege of any one riparian state in relation to the others". The proposition therefore is that where a state takes action in its territory which causes direct and obvious deprivation across an international border, it is in breach of its international obligations and regardless of the absence of any treaty. The maxim sic

utere tuo ut alienun non laedas - use your property in such a manner as not to injure that of another although not particularly illuminating, fairly summarizes the accepted international custom. However customary international law has never been a precise body of law, particularly with regard to international environmental matters. As Ludwik Teclaff points out "[T]he problem with general principles like good neighborliness and abuse of rights is that they lack sufficient precision to permit their application with any degree of confidence in concrete cases; and they become superfluous in an area such as modern fluvial law in which more or less concrete rules are developed".[275] Its concrete application therefore necessarily triggers off discordant interpretations. As nations are unwilling to agree to unclear future commitments, they do not readily submit to international adjudication the results of which they cannot predict.[276] Ironically, uncertainties persist because too few cases are submitted for international arbitration.

Customary international law may therefore be of little value for environmental protection, particularly with regard to the marine environment. Traditional customary international law of the sea evolved solely to ensure harmonious use and exploitation of ocean resources among nations. Environmental protection hardly featured

in the formulation of such rules, and attempts to expand them to meet with evolving contemporary realities have been largely unsuccessful because as W. Friedman observes "[C]ustom is an unsuitable vehicle for international "welfare" or "cooperative law". The latter demands the positive regulation of economic, social, cultural and administrative matters, a regulation that can only be effective by specific formulation and enforcement".[277]

(B) Treaties and Conventions

The law is notorious for lagging behind technology and social changes, treaties have become an effective international tool for bridging this gap in addition to clarifying hazy and problematic aspects of customary international law.

The dynamics of modern international relations has made treaties in both scope and volume, the most important and progressive source of international law. Particularly is this so for international environmental law.

There exist a plethora of bilateral and multilateral treaties and conventions on various aspects of environmental protection particularly in the field of international river problems. It is impossible to deal effectively with all of them. We shall only attempt to examine some of the multilateral treaties and some unilateral legislation and evaluate what relevance they have to our inquiry.

(i) The Continental Shelf Convention (1958)

Article 2 of the convention provides that coastal

states exercise "sovereign rights over the continental shelf for the purpose of exploring it and exploiting its natural resources". The coastal states do not therefore have sovereignty over the continental shelf but merely exercise sovereign rights over it.

Art. 5(1) provides that "the exploration of the continental shelf and the exploitation of its natural resources must not result in any unjustifiable interference with navigation, fishing or the conservation of the living resources of the sea...." However the convention permits the establishment of "installations and other devise" necessary for exploitation of the continental shelf and the creation of a 500-meter safety zone around them for protection. Within these zones, the coastal state is obliged to take "... all appropriate measures for the protection of the living resources of the sea from harmful agents".[278]

These provisions raise a host of unanswered questions. For instance what would qualify as "unjustifiable interference"?. The convention gives no clear guidance. The answer would probably depend on the circumstances of each case. It could also be influenced by factors such as the magnitude of potential harm, reasonable foreseeability of the occurrence of the harm, preventive measures taken etc.

The "appropriate measures" to be taken by states are

also unspecified. This confers on coastal states an unfettered discretion to draw-up their individual regulations, a fact that has led to very lax and scanty environmental standards and regulations. In relation to oil drilling however, it has been largely interpreted as requiring "operators to observe the provisions of good oil industry practice" and to provide requisite equipment to stop the flow of petroleum if a blow out occurs, or if there is a break in the well casing or pipeline".[279]

Further, the measures so taken must relate to protection from possible harmful consequences of activities authorized by the coastal state itself; which means that the convention does not authorize coastal states to take steps to prevent the occurrence of harm from operation not authorized by it and taking place outside its jurisdiction. Consequently provisions of the convention are hardly applicable to operations in the international area.

Again, the convention's environmental protection provisions are applicable only to living resources of the sea. The intricate interrelationship of the marine ecosystem requires that environmental protection be extended to all aspects of the marine environment.

The convention is therefore of little relevance here. It imposes no clearly defined environmental duties, probably because it was designed to facilitate

exploitation rather than environmental protection.

(ii) The High Seas Convention (1958)

Article 2 of the convention provides that "the high seas being open to all nations, no state may validly purport to subject any part of them to its sovereignty".

Art. 24 provides that "Every state shall draw up regulations to prevent pollution of the seas by the discharge of oil from ships or pipelines resulting from the exploitation and exploration of the seabed and its subsoil, taking account of existing treaty provisions on the subject". Art. 25 enjoins every state "to take measures to prevent pollution of the sea from dumping of radioactive waste, taking into account any standards and regulations which may be formulated by the competent international organizations". It should be noted that the international law commission, in its commentary on the draft articles which preceded articles 24 and 25, specifically referred to pollution resulting from defects in installations from the exploitation of the seabed and its subsoil.[280] The High seas convention on account of this may have some relevance for the deepsea environment. However the provisions of the convention are hardly adequate for any meaningful environment protection. Article 24 for instance, merely required states to regulate oil pollution from ships, pipelines and seabed operations, it did not specify the contents or standards

of such regulations except that states take into account existing treaty provisions. Some states adopted very low national standards, while others, though accepting international standards, were lax in inspecting, prosecuting violations or acting on reports from coastal states.[281] As Utton rightly points out article 24 "is quite general and no guidelines are provided .... Therefore the vaguest of regulations would probably satisfy this mandate...."[282] He concludes that state regulations "are consistently general in nature, relying to a large extent on the subsequent wisdom of both the drilling company and the supervisory authority."[283]

Although art. 25(2) provides that "all states shall cooperate with the competent international organizations in taking measures for the prevention of pollution of the seas or air space above, resulting from any activities with radioactive materials or other harmful agents". Its exact implications are unclear. McDougal and Burke,[284] suggest that this provides no more than an admonishment to cooperate, while Kirgis Jr.,[285] submits that they are obligatory. Even if one concedes that the provision is obligatory, it does not substantially improve the convention. The measures to be taken by states are unspecified; the extent of the duty still remains uncertain. This leads us again to the conclusion that the convention merely lays down broad guidelines, leaving the

states to work out the specifics.

The High Seas convention is also inadequate because the obligation on states to enact regulations was limited to a narrow scope of pollutants, for instance, dumping and land-based sources of pollution were not included. The convention also failed to provide for any enforcement or dispute settlement mechanisms.

It may be concluded therefore that although the High Seas Convention may be of some relevance to the seabed environment, it is highly inadequate for any effective environmental protection programme. In fact the whole concept of the freedom of the seas is regarded as antithetical to an effective environmental regime. According to C.C. Joyner,[286] "Literally exercising freedom of the seas essentially has been tantamount to precluding any legal conditions for rationally exploiting the ocean's bounty. That is, while admittedly freedom of the seas preserves the common property distinction of the ocean, it has been sinisterly perverted into breeding confusion, waste, and conflict over appropriating and protecting marine resources".

Both the high seas and continental shelf conventions exhibit common features. They both empower states to regulate offshore operations with only a limited restriction imposed by international law (whose standards were permissive rather than obligatory). Although some

states did make some regulations, the absence of any specific standards or any mechanism for establishing such standards or inquiring into existing national standards, makes these treaties of relatively little practical significance.[287] Their significance however lie in the recognition of the necessity of regulation and imply the existence of international responsibility for transnational damage resulting from the absence of or inadequate regulations.

(iii) Oil and Shipping Conventions

The introduction of supertanker oil traffic increased the rate of marine accidents resulting in tankers spilling very large amounts of crude oil. Oil spillage being very conspicuous has been the most publicised form of marine pollution and consequently the most regulated.

There exist a host of conventions regulating oil and supertanker traffic.[288] They have no direct relevance for us in this work, except perhaps to serve as guides. We shall therefore refer to some of them later in this work.

(iv) United Nations Resolutions, Declarations and Conventions

The United Nations has probably one type of resolution or another on virtually every aspect of international relations. In some instances where it considers the matter to be of particular importance, it makes a declaration on the issue. The legal effect of these resolutions and declarations is subject to some

controversy. Some dismiss them cynically as the "cult of declarations",[289] a situation where legal controls exist only on paper. They argue that General Assembly resolutions are recommendatory only, and cannot be binding unless the security council considers non-compliance to be a threat to peace.[290] While it is acknowledged that General Assembly resolutions enunciating general principles for states activities may have only a recommendatory character, but as G.F. Kalinkin observes, they nevertheless have "great political and moral significance".[291] This is especially true of resolutions adopted unanimously or by an overwhelming majority of votes of different state groupings, e.g. the western, socialists and developing countries. Such resolutions could concertise the existing law, or function as authoritative expressions of the opinio juris in the formation of a rule that can in future turn into compulsory juridical rules.

Resolutions and Declarations have also been dismissed as too general and imprecise to be of any use in concrete situations. Judge Baxter submits that such generalization and imprecision is central to the nature of resolutions and declarations. He argues that "states have on a number of occasions undertaken the preparation of instruments which deliberately do not create legal obligations but which are intended to create pressures and to influence

the conduct of states and to set the development of international law in new courses. I have to speak with a certain imprecision because it is of the very essence of these agreements that their legal impact is designedly left unclear. More often than not, this happens under the stress of international negotiations in which the parties cannot agree upon clear rules or principles to be followed."[292]

Most United Nations declarations were responses to areas in need of further development, and although they do not command compulsory legal obligation, they serve as prescriptive statements which may not easily be disregarded by a tribunal. Rosalyn Higgins warns us that the law should not be seen "merely as a technical set of rules and procedures, but as the authoritative expression of principles that determine the goals and direction of collective action."[293]

(a) <u>The Declaration of Principles Governing the Seabed and Ocean Floor</u>

In 1970 when it became clear that some valuable mineral resources were buried in the deep seabed the United Nations General Assembly made the 'Declaration of Principles Governing the Seabed and Ocean Floor, and the Subsoil Thereof, Beyond the Limits of National Jurisdiction'.[294] Paragraph 11 of the declaration, states that "with respect to activities in the area and acting in conformity with the

international regime to be established, states shall take appropriate measures for and shall cooperate in the adoption and implementation of international rules, standards and procedures for inter alia:

(a) Prevention of pollution and contamination, and other hazards to the marine environment, including the coastline, and of interference with the ecological balance of the marine environment;

(b) Protection and conservation of the natural resources of the area and prevention of damage to the flora and fauna of the marine environment.

Paragraph 14, provides that damages caused by activities in the area shall entail liability.

This declaration is a generalised statement of intent rather than a precise legal test. It did not define some important terms used in its text. Such terms include "area beyond the limits of national jurisdiction", "pollution" and "Marine environment". Despite this deficiency Frederick Kirgis Jr., argues that the declaration sounds like a "constitutional document, complete with carefully drawn expectations..., it might well be found to have a "quasi-legislative" character achieved through the familiar legislative process of bargaining and compromise".[295] He concludes from that premise that the Declaration or more accurately, the share values

it embodies, will influence the behaviour of nations even before the creation of any international seabed regime, and will do so with greater force than that of a mere recommendation.[296] Subsequent events have proved that Kirgis' conclusion was too optimistic. Even at the time of passing the Declaration many delegates expressed the view that it would not have binding legal effect.[297] There is no doubt however, that it did have a subtle political effect and may have been the genesis of a customary rule of environmental protection of the seabed. The declaration further showed that there was an awareness that the deep seabed environment needed some form of protection from pollution hazards.

(b) The Stockholm Declaration on the Human Environment (1972)

The general unsatisfactory state of international environmental law and increased environmental consciousness led to the 1972 conference on the Human Environment in Sweden. The outcome of that conference is embodied in the 1972 Stockholm Declaration on the Human Environment.[298] It contains a set of principles, declarations and recommendations which sought to establish a normative framework for international environmental protection.

The principles and declarations essentially stress the importance of preservation and protection

of the human environment. Principles 21 and 22 attempt to clarify the circumstances under which liability may be incurred for transfrontier pollution. Principle 21 states that "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 policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or areas beyond the limits of national jurisdiction". Apart from the inclusion of the "areas beyond the limits of national jurisdiction", this principle merely restates the accepted customary rule of territorial sovereignty over resources and the right to exploit same, coupled with the responsibility to ensure that such activities do not cause environmental damage to other states. The obligation imposed by this principle is permissive because states are free to exploit resources pursuant to their "own environmental policies", which may include activities with high or uncertain environmental risks. Such a permissive formulation is of limited value both as a loss distribution system and as a basis for efficient policies of prevention.

Principle 22 was an acknowledgement of the inadequacies of existing international law, because it enjoined states to cooperate in the further development of international law regarding liability and compensation for victims of pollution and other environmental damage. This principle merely deferred the issues as discussions of detailed rules at the preparatory committee revealed divergent opinions.[299]

Principle 7 makes a casual reference to marine pollution, and even then it employs exhortative and imprecise language. States are required to take "all possible steps" to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

The Declaration was however long on recommendations on marine pollution. Recommendations 86 and 92 implore states to accept and implement existing instruments on the control of marine pollution, to ensure the effectiveness of controls on vessel-source pollution and dumping at sea and to participate in new efforts to bring all sources, under appropriate controls. Recommendations 87 to 91, call for special measures to protect enclosed and semi-enclosed seas and to promote research and

monitoring by national and international agencies.

Although the U.N. General Assembly has expressly resolved that principles 21 and 22 of the Declaration lay down the basic rules of international responsibility of states with regard to the environment,[300] it is doubtful whether these principles impose legal obligations on states. Louis B. John believes they do. He argues that in certain circumstances international law can be created through the adoption by universal consensus of declarations establishing new principles for areas previously ungoverned by any agreed rules. Those circumstances according to him include, the existence of an urgent topic, a propitious international climate; adequate preparation; and a dedicated group of well-qualified people with the will to achieve meaningful results. All these criteria in his opinion were fulfilled by the Stockholm declaration.[301] He draws an analogy with the Universal Declaration of Human Rights and concludes optimistically that "..., despite the statements by some of the conservative participants in the drafting of the Stockholm Conference that this document is not a binding legal instrument, it is quite likely that in the not too distant future a more enlightened view of the nature and structure of the Stockholm

Declaration will be accepted".[302]

A careful reading of the Declaration will however reveal that it was intended as a political text relying substantially on the voluntary cooperation of participating states working together on a policy-making level. The preparatory committee of the conference intended the Declaration to be "concise and inspirational, embodying the aspirations of world's people for a better environment".[303] The Committee pointed out that by its very nature, the Declaration should not formulate legally binding provisions in particular as regards relations between states and individuals, or as between the latter, which it considered in principle to be governed by national legislation.[304] It was the prevailing views of members of the Committee, that the Declaration should merely outline "broad goals and objectives", while detailed action programs should be embodied in other documents to be adopted by the conference.[305] These intentions are reflected throughout the Declaration and as the Secretary-General of the conference himself pointed out, the fundamental task of the conference and ipso-facto the Declaration was not to make law, but to take political decisions that will lead to environmental cooperation.[306]

The Declaration may be hopelessly inadequate for

any effective environmental protection regime, but it was faithful to its objective - the establishment of basic rules of international environmental law. It was a watershed development for international environment law because it represented the first broad-based and comprehensive international political consensus on environmental issues. As a result of its wide acceptance it is relevant to the deep seabed environment, because it may be argued as Boleslaw Adam Boczek does, that "the duty to protect the environment is a rule of jus cogens, that is, a peremptory norm of general international law". Admittedly, the jus cogens argument is neither too convincing or illuminating.

(c) World Charter for Nature

The idea of a world charter for nature was first muted by President Mobutu Sese Seko of Zaire in an address to the Twelfth General Assembly of the International Union for Conservation of Nature and Natural Resources (I.U.C.N.) in September 1975.[307] That same year a multi-national task force began to draft the charter as a guide for regulating international environmental development.[308] The charter was passed by the General Assembly of the U.N. in 1982.[309] It is divided into four parts, the preamble, general principles, functions, and

implementations. Its underlying premise is that the global environment needs substantive and procedural protection from the adverse impacts of social and economic development. Although the Charter employs mandatory terms in its text, there is little doubt that it was intended more as a political and moral document than a legal one. The ad hoc group of experts responsible for the draft, notes that "by its very nature, the charter could not have any binding force, nor have a regime of sanctions attached to it".[310] The group preferred the term "shall" to "should in the text, because a charter, though entirely non-mandatory in its effect, has the character of a proclamation directed to states for their observance.[311]

The usefulness of the Charter therefore, it that is sets aspirational goals to be strived at by the world community. As I.U.C.N.'s Peter Jackson puts it, "The World Charter for Nature will not suddenly change the world. Nor did the Universal Declaration of Human Rights. But it is a major step forward to have conservation enshrined among the highest principles of the United Nations."[312]

(d) The Third United Nations Convention on the Law of the Sea (UNCLOS III) 1982.

It is evident that all the regulations considered above, have only marginal significance for

the deep seabed, as none specifically addresses the area. This is not surprising because until recently the deep seabed was hardly significant enough to warrant specific regulations. The Third United Nations Conference (UNCLOS III), was the first attempt to make regulations directly addressing the seabed environment. We shall next consider this important Convention.

Until the 19th century, the law of the sea was operated on the basis of customs developed through uniform and consistent state practice. By the late 19th century however, the idea of codifying the law of the sea gained popularity. Earlier efforts at codification were conducted by learned societies, e.g. the International Law Association and the Institue de Droit International.[313] In the late fifties the United Nations became a principal organ for the codification of the law of the sea. Its efforts have resulted in the four Geneva Conventions of 1958 and more recently the draft convention of the law of sea, 1982. UNCLOS III, in scope and size represents the most ambitious treaty ever embarked upon by the United Nations. This may be explained by circumstances surrounding the conference itself. On the day the Declaration of General Principles Governing the Seabed was passed, the General Assembly

also passed resolution 2750 (XXV),[314] calling for a convocation of a new law of the sea conference. Most developing states, who had recently gained independence, viewed the Law of the Sea (as it then existed), as serving only imperialists goals. They therefore demanded a thorough overhaul of the entire system for one that would reflect current realities of international relations. Consequently, the law of the sea conference was charged with looking into and revising every aspect of the law of sea including the high seas, continental shelf, territorial seas, contiguous zone, seabed, fishing and conservation, preservation of the marine environment and freedom of scientific research.[315] After a long and sometimes acrimonious negotiations a draft convention was signed in Montego Bay on December 10, 1982, by 140 states and nine other entities.[316]

(i) General Provisions

UNCLOS III provisions on pollution combines the traditional law of the sea approach of looking at the geographic status of the area involved, with a topic by topic approach, by specifically looking at the source of pollution.

Part XII of the Convention contains provisions detailing the broad duty of all participating nations "to protect and preserve

the marine environment".[317] Articles 194 and 198, provide that states are to avoid causing pollution damage to other states. This is merely a restatement of the accepted customary law rule. Article 194(1) goes further and imposes an obligation on states to take all measures necessary to prevent, reduce and control pollution of the marine environment.

Articles 194(2) and 195 enjoin states to ensure that activities under their jurisdiction or control do not cause pollution damage to other states or otherwise spread beyond the seas where they exercise sovereign rights.

Article 235, provides that states are responsible for the fulfillments of their international obligations concerning the protection and preservation of the marine environment, and "shall be liable in accordance with international law". This probably refers not only to obligations under the convention but "international environmental obligations" in general. This conclusion is fortified by art. 237 which provides that UNCLOS III provisions bind parties without prejudice to their specific obligations assumed under other conventions. However arts. 197 and 201, provide that these

other obligations should be carried out in a manner consistent with the convention.

(ii) The Deep Seabed

International environmental law has hitherto concentrated on protecting coastal states from the perils of pollution affecting or likely to affect them. The focus has been on pollution of coastal waters, civil liability regimes for damage caused to coastal state interests, greater power of intervention and wider zones of jurisdiction over shipping. Protection of the areas outside national jurisdiction has hitherto been minimal or negligeable.

Art. 209, which specifically deals with pollution of the seabed merely states that rules, standards, practices and procedures for the environmental protection of the area shall be in accordance with the provisions of Part XI of the Convention. We shall therefore examine some of the relevant provisions of part XI.

Art. 145, provides that necessary measures shall be taken with respect to activities in the area, to ensure effective protection of the marine environment. Art. 145(a) recognises the need for "protection from harmful effects of

such activities of drilling, dredging, excavation, disposal of waste, construction and operation or maintenance of installations, pipelines and other devises related to such activities".

Under Article 162(w), sites for mining for the Area could be denied to the seabed authority's mining concern or contractors if substantial evidence indicates the risk of serious harm to the marine environment.

Art. 165(2)(d), and (e) empower the legal and technical commission (to be established under UNCLOS) to "prepare assessments of the environmental implications of activities in the area", to "make recommendations to the council on the protection of the marine environment, taking into account the views of recognised experts in that field", and to recommend "to the council to disapprove areas for exploitation by contractors or the enterprise... [when] evidence indicates the risk of serious harm to the marine environment".

Article 209 makes provision for rules and standards devised for the area to be reviewed from time to time. Article 154 stipulates how such review shall be carried out. It permits

the Assembly to undertake a "general and systematic" review of the overall operation of the international regime in the area every five years. Inadequacies uncovered shall be corrected on the authority of the Assembly. This provision might be useful in keeping environmental regulations abreast of developments.

Article 165(2)(g) further empowers the legal and technical commission, which is charged with assessing the environmental implications of activities in the area and formulating rules and recommendations based on such assessments, to "keep such rules, regulations and procedures under review and recommend to the council from time to time such amendments thereto as it may deem necessary or desire".

The technical commission is required to recommend to the council issuance of "emergency orders" for the "adjustment of operations to prevent serious harm to the marine environment arising out of activities in the area". Such recommendations for revision must be "taken up by the council on priority basis...."[318]

Article 17(2)(b)(iii) of Annex III to the Convention requires that "the total duration of

exploitation... should ... be short enough to give the authority an opportunity to amend the terms and conditions of the plan of work" in accordance with rules and regulations under the convention.

Article 19(i) of Annex III further requires the "revision of [a] contract" when "circumstances have arisen or are likely to arise" which make it "unlikely or impossible to achieve the contract objectives". Environmental concerns would definitely be included is such circumstances.

It is obvious from the provision of the convention that it is not a code of specific standards for particular forms of pollution but rather, the first attempt to set out a general framework for a legal regime that establishes on a global conventional basis, the obligations, responsibilities and powers of states in all matters of marine environmental protection.[319] The Convention however shows a considerable shift in attitude - from freedom to pollute, to obligations of control, regulation, enforcement, cooperation and responsibility. This is in fact, the main difference between the Geneva Conventions and UNCLOS III. While under the

former, states were free to determine for themselves the extent of control and regulation of the marine environment, the latter requires states to do so on its term.[320] For example, article 211(2) of UNCLOS III imposes a duty on flag states to adopt laws and regulations to prevent, reduce and control vessel-source pollution. Such regulations must "at least have same effect as that of generally accepted international rules and standards established by the competent international organization or general diplomatic conference". It must be conceded however, that such international standards do not yet exist. In fact the convention imposes upon states the duty to cooperate globally and regionally in the development of international law of liability and international standards for the conduct of offshore activities.[321]

UNCLOS III contains some major defects. For instance, it does not address the problem of processing of seabed minerals on mining ships, which as we saw earlier is a potential source of marine pollution. It is also silent on the status of such mining ships - are they mere moving platforms, mere ships or mobile plants?.

Some organizational deficiencies are also observable. For example, the principal organs of the proposed International Seabed Authority (ISA) are the assembly, the council and the enterprise. Environmental responsibilities are spread among the Assembly, the council and the legal and technical committee. However, the primary responsibility of these bodies is the promotion of resource development. The convention makes the International Seabed Authority more of an entrepreneur whose primary responsibility is maximizing profit rather than a pollution control authority. Clearly, the convention puts economic considerations ahead of environmental protection.

The council of the ISA is also charged with the responsibility of making environmental decisions. A three-fourth majority of the council is required for decision-making on environmental matters.[322] The council will have thirty-six members, half of whom will represent four major interest groups,[323] while the rest will represent equitable geographic distribution. Such an unwieldy assembly will have a difficult time getting the required number of votes, given their diverse and

competing interests. The three-fourth requirement will be cumbersome and therefore environmentally unsound as it might stalemate important decisions.

The convention on the whole made noteworthy environmental innovations, but its approach was understandably cautious, preferring in most parts to build on existing principles rather than trying anything radical. For a convention that was intended to cover every aspect of marine pollution broad-based support was necessary. It could only garner such support if it moved cautiously. It is not surprising therefore, that the convention satisfies itself with laying down broad guidelines. In fact with regards to the deep seabed it merely contains enabling provisions for the negotiation of more specific rules elsewhere.

Finally, the status of the convention is far from certain. As we remarked earlier, it is yet to come into force as it has been unable to get the required number of ratifications. The ICJ in the Fisheries Jurisdication Cases (U.K. v Iceland)[324], held that the proposals put forward in UNCLOS III, however broad their support, "must be regarded as manifestations of the views

and opinions of individual states and as vehicles of their aspirations, rather than as expressing principles of existing law". MacRae disagrees, he argues that "The United Nations Law of the Sea Treaty, despite protestations to the contrary, has codified with almost unanimous international consent, customary law of the sea".[325] The two positions are extreme. A middle ground maybe found. it may be safe to assert that some of the provisions of UNCLOS III, e.g. EEZ and the 12 Miles Territorial Seas Limit, have since become customary law because of worldwide acceptance, while others such as the legal regime of the international area (which remains controversial) have not. What this and other shortcomings of the convention indicate is that "..., the legal regime of offshore mining and drilling pollution prevention, though only one part of the law of the sea, is nonetheless a vast topic, and much work remains to be done both by way of technological research and by way of development by states of national and international law.[326]

(C) Some Specific Problems

All the legal controls examined above leave a number of difficult questions unanswered. For instance, the question of

liability is far from settled. Should liability be based on fault, e.g. acting without appropriate operational safeguards or without authorization or should the presence or absence of fault be irrelevant? Some suggest that strict liability is applicable in environmental matters while others suggest absolute liability. Strict liability means that compensation is due from the defendant for injuries caused to others, despite the absence of fault. The difficulty of determining what kind of conduct is negligent or not, as well as the problem of presenting facts necessary to establish negligence, have made the imposition of strict liability for some activities compelling. The Locus Classicus is Rylands v Fletcher,[327] where the court imposed liability without proof of the defendant's fault for harms which resulted from the "escape" of the substance from land due to "non natural" use.

There exist some controversy over the term absolute liability. Professor Winfield argues that "strict liability" and "liability without fault" are preferable to "absolute liability". He contends that the exculpatory rules which have been developed by the courts to mitigate the rigours of a defendant's liability, e.g. "act of God", render the adjective "absolute" a misnomer.[328] L.F.E. Goldie however, thinks that absolute liability indicates a more rigorous form of liability than strict liability.[329] He submits that the concept of absolute liability developed in the "nuclear liability treaties (i.e.,) the combination of channelling with the imposition of

liability upon the operator in all cases except where the society as a whole may be viewed as responsible..."[330] The Nuclear Conventions referred to by Goldie, e.g. the convention on the liability of operators of nuclear ships,[331] incorporate the concept of "channelling", which traces liability back to the nuclear operator, no matter how long the chain of causation, nor how novel the intervening factors. They allow only a limited exceptions, e.g. Art. 9 of the Paris convention on Third Party Liability in the field of Nuclear Energy (1960), provides that the operator is only exculpated if the acts complained of are "..., directly due to ... disturbances of an international character such as armed conflict and invasion, of a political nature such as civil war and insurrection, or grave natural disasters of an exceptional character, which are catastrophic and completely unforeseeable on the grounds that all such matters are the responsibility of the nation as a whole". The Explanatory Memorandum underscores this point. It indicates that, the operator's liability is "not subject to the classic exonerations for tortious acts, force majeure, acts of God or intervening acts of third persons".[332]

Customary international law also appears to favour liability without fault. In both Trail Smelter and Corfu Channel cases, the plaintiff states were not required to prove the defendants' negligence or willful fault. It is possible that the tribunals assumed fault on the part of the defendants which they did not rebut. These cases are however inconclusive

as authorities for strict or absolute liabilities. Nevertheless the trend appears to be that most environmental regulations impose strict liability for non-hazardous activities, but absolute liability for extremely hazardous activities.

Some doubts also exist as to whether environmental issues are actionable per se, i.e. without proof of injury. The special rapporteur of the I.L.C., concluded while reviewing the discussion on state responsibility that "under international law an injury, material or moral [was] ... necessarily inherent in every violation of an international subjective right of a state".[333] Consequently, economic injury, if at all sustained, did not constitute a "prerequisite for determination that an internationally wrongful act... [had] been committed...."[334] This opinion was probably based on the sentiment that the violation of an obligation always involved a moral wrong.[335]It is further argued that a traditional tort concept like "proof of injury" is inapplicable in some environmental cases, because such loss as recognised by the law cannot be attributable to specific individual or group of individuals. However, case law, state practice and the opinion of jurists, dispute such arguments. According to Eagleton "Responsibility is simply the principle which established an obligation to make good any violation of international law producing injury, committed by the respondent state".[336] Günther Handl concurs, "situations of conflicting rights, are necessarily characterized by claims

of injuries sustained. Hence it follows logically that injury serves as the starting point in the assessment of the facts of the case and undoubtedly has a decisive impact on the inference from the general principle applicable...."[337]

Most environmental cases are won or lost on the ability or otherwise of the plaintiff to prove injury. For example, the Trail Smelter tribunal rejected U.S. claim for "damages in respect of the wrong done to the U.S. in violation of sovereignty".[338] The U.S. claim was based on money expended "for the investigation undertaken by the U.S. government of the problems created in the U.S. by the operation of the Smelter at trail".[339] The tribunal while rejecting the claim concluded, that "it was not within the intention of the parties, as expressed in the words "damage caused by the Trail Smelter" in Art. III of the convention [compromis] to include such moneys expended... since the U.S. has not specified any other damage based on an alleged violation of its sovereignty, the tribunal does not feel that it is incumbent upon it to decide whether, in law and in fact, indemnity for such damage could have been awarded if specifically alleged."[340] This conclusion would support the proposition that damage is a prerequisite for liability. However, it is evident that the tribunal was specifically interpreting the convention between the two states. It may be argued therefore that it did not lay down any general rule of international law. In the Corfu channel case, the I.C.J., held that operation retail, a mine sweeping

carried out by British Naval Units in Albanian waters, had violated Albanian sovereignty. The "reparation awarded" was that such declaration was "in itself appropriate satisfaction"[341] This decision is ambiguous because despite a finding by the court that there had been a violation without proof of injury, it awarded no damages. This case demonstrates the extreme reluctance of courts to award damages without proof of injury. We may conclude our discussion on liability, by observing that the trend definitely favours absolute or strict liability for environmental matters. As we shall argue later on in this work, liability should be flexible enough to allow less stringent standards in cases where lower standards are appropriate.

Another problem area is the issue of locus standi. An individual generally has no right to appear as a party before an international tribunal, nor can he legally force his own government to press a claim against another state on his behalf.[342] Although this traditional position is progressively been attenuate,[343] states remain the dominant claimants before international tribunals. None of the treaties and conventions examined in this work satisfactorily address this issue. For instance, under UNCLOS III, the International Seabed Authority (ISA) is responsible for environmental matters in the international area. If the I.S.A. is unwilling or unable to bring an action for pollution damage or violation, can a member state do so?; Put differently, will states have sufficient

legal interest in prospective harm to the area to justify bringing individual actions? What type of harm would entitle a state to such an action?; Can the United Nations itself bring such an action in the event of a failure to do so by the Authority?; Can states bring action against the Authority and/or the polluter for activities conducted in the area but causing harm within national jurisdiction?; Can individuals bring private actions against the Authority and/or the polluter if their states are unable or unwilling to do so?; Must such actions be brought before the international tribunal set-up under UNCLOS III, or can they be heard by national courts?. These and more questions must be addressed by those responsible for formulating the specific environmental rules for seabed activities. As we shall contend later, giving exclusive litigation rights to the Authority and states would be environmentally unsound.

The standard of proof in environmental cases has also been a tricky question. The Trail Smelter tribunal held that the harm must be "...of serious consequence" and the injury must be established by "clear and convincing evidence".[344] Since in a vast number of cases the injury would be prospective, the standard of proof required would be very high. This is significant because, it is difficult in most environmental cases to establish a direct causal relationship between a single pollutant and an injury, due to the fact that damage is usually caused by a multitude of pollutants from a variety of

sources. A general characteristic of pollution, whether of the atmosphere, the high seas and the hydrologic cycle, is the gradual and dispersed nature of the processes of degradation. A single pollutant is rarely responsible for damage. The cumulative processes involve problems of identifying tortfeasors, of establishing evidence of causation and of remoteness of damage. Furthermore, the latent effects of some pollutants are presently unknown, especially is this true of deep seabed mining, which would employ very new technology largely untested in the marine environment. Consequently, the environmental impact would be largely conjectural. It is conceded that damage or threatened environmental hazard must not merely be hypothetical, but substantial, significant, real or unacceptable, but to insist on "clear and convincing" evidence for a new endeavour like the seabed mining, would be tantamount to adopting a 'wait and see' attitude, the consequences of which might cause irreversible damages to the marine environment.

The bane of international law and particularly international environmental law is enforcement. A law is only as effective as the mechanism of its enforcement. W. Michael Reisman, described enforcement as the "crucible of law, the test of its reality".[345] Enforcement of international marine environmental law is difficult because it involves both jurisdictional and technical regulations.

The world's legal and political order is dominated by the

reality of sovereign states. A fact that virtually makes the enforcement of international legal sanctions ineffective unless the defaulting state consents. The effectiveness of any regulation, in the main, depends on the good faith of states, and particularly on coastal and flag states. For example, the International convention for the prevention of pollution of the sea by oil, (1954), provides that a state that discovers violation has to report it to the flag state, which, if it is "satisfied that sufficient evidence is available in the form required by its law to enable proceedings against the owner or master of the ship to be taken in respect of the alleged contravention,... shall cause such proceedings to be taken as soon as possible".[346] This clearly confers the discretion to prosecute or not on the flag state. Other conventions, e.g. the Territorial seas convention, confer jurisdiction on coastal states. The inadequacy of relying on both the coastal and flag states for enforcement is obvious,. Coastal states jurisdiction is limited to territorial waters. Even with the recent expansion of their jurisdiction to include the Exclusive Economic Zone, it is doubtful if they can effectively police such wide zones.

Flag States jurisdiction, though useful especially for high seas pollution, had its effectiveness seriously eroded by the phenomena growth of "flag of convenience" fleets. It has been observed that one of the characteristics of a state offering a flag of convenience is that it "has neither the

power not the administrative machinery effectively to impose any government or international regulations; nor has the country the wish or power to control the (shipping) companies themselves.[347] In fact strict enforcement in one state's jurisdiction might persuade ships to register in another with less control. The implications of this development is grave, when it is realised that over twenty per cent of the world's tonnage sail under "flag of convenience".[348]

Furthermore, most states are more concerned with their immediate short term national interests than the global environment. They consider the administrative cost of enforcing international law not worth their while. Developing states in particular regard pollution control as secondary, to be pursued after attaining an acceptable level of affluence.[349] They argue that environmental regulations are inequitable because they restrict their development, while developed states were free to externalize costs during their earlier periods of development.[350] It is not surprising therefore that records of violations and prosecutions are dismal, revealing a general unwillingness of flag and coastal states to prosecute. According to IMCO (now IMO) there has virtually been no prosecution under 1954 convention for the prevention of pollution of the sea by oil.[351]

These deficiencies have led to some changes. For instance, art. IX of the 1969 convention on civil liability, enables proceedings to be brought in the courts of the victim's

state, whether or not the person causing the damage is otherwise subject to the jurisdiction of that state.[352] The right of coastal states to intervene on the high seas in cases of maritime casualties that cause or are likely to cause pollution damage was granted by the 1969 Convention on Intervention on the High Seas in cases of oil pollution casualties and extended to other forms of pollution by the protocol relating to intervention on the High Seas in cases of marine pollution by substances other than oil. It must be noted that this right can only be exercised by coastal states to prevent any "grave and imminent" danger to their coastline following a maritime accident.[353]

UNCLOS III has attempted to improve on the modest improvements of these conventions, by broadening the base of enforcement. Art. 218, entitles a port state to investigate and prosecute pollution violations on the High Seas or within the jurisdictional zones of other states. The power to prosecute for High Seas violations is discretionary on the port state but it can only prosecute for violations in another state at the request of the coastal or flag state concerned.[354]

Article 288(1), however confers a right of preemption on the flag state, which entitles it to take over proceedings except where there has been major damages to the coastal state. The flag state is however under an obligation to continue the proceedings, and it loses its right if it repeatedly disregards its obligations.[355] The convention has therefore diluted the

flag states' jurisdiction, although it still retains considerable control over proceedings involving its vessels. It appears therefore, that only marginal gains have been made.

The main machinery for prescribing and enforcing environmental regulations for the deep seabed proposed by UNCLOS III are; the International Seabed Authority; the International Tribunal for the law of the sea (to be constituted) and the International Court of Justice.[356]

The International Tribunal for the law of the sea is a novel proposition. In fact the establishment of a Tribunal as an organ of the Seabed Authority was suggested as a necessary part of the package of institutional arrangements. It was rejected on the ground that the proposed law of the sea tribunal for compulsory settlement of disputes under the convention was more appropriate, as a special seabed tribunal would always tend to decide in favour of the assembly.

The centre theme of UNCLOS III's seabed environmental regulations is international control and enforcement. This generated the controversy that plagued the convention during and after the conference. The basic disagreement concern who and which body should be responsible for prescribing the appropriate standards in the international area. Or as Jane Schneider puts it "who shall speak for the commons?" or even, more conservatively "who can speak for the commons?"[357] The alternatives being either the individual states or an international agency.

An international agency was opposed principally on the ground that it would be ineffective. It was argued that the inherent complexities of the problems themselves, and the realities of state sovereignty with their myriad political and economic interests would ensure the failure of any international arrangement. Professor Chayes argues that "It requires very little acquittance with the international system as presently constituted to realize that it would be unable (to legislate and enforce pollution standards). The resources both for legislation and enforcement at the international level are painfully slender, and they are not likely to be increased in the immediate future".[358] It is conceded that the creation of a world organ to take charge of seabed environmental affairs is not a magic wand for an effective environmental regime. However, to rely solely on individual states, who may have suffered no direct injuries, for enforcing pollution standards in the international area, is one sure way for reducing the convention to irrelevance. The bare fact is that states would have no sufficient incentives or interest to seek redress. With sufficient goodwill from states, international control can be effective. Once the world community accepts the fact of international control of the international area, international enforcement becomes inescapable.

It may be mentioned in passing that criminal sanctions have been suggested as a possible panacea for curbing violations of environmental regulations. Art. 19(3)(d) of the

International Law Commission's draft Treaty on State Responsibility, states that an 'international crime' may result, inter alia from "a serious breach of international obligation of essential importance for the safeguard and preservation of the human environment, such as those prohibiting massive pollution of the atmosphere of the seas".[359] Criminal Sanctions in environmental control is an attempt to enlist the coercive force of the criminal process to ensure compliance through both the threat of imprisonment and the social stigma of the criminal label. It is doubtful if this adds anything to the law of state responsibility. It however reflects the repulsiveness with which pollution is held.

There is no doubt that an efficient enforcement scheme will require an adequate administrative structure that can effectively monitor activities in the deep seabed. This will of course demand securing the services of skilled personnel and a judicial process that commands global respect. Otherwise the law would be honored more in breach than observance. This would be counter-productive and could lead to a situation where accession to the convention becomes "a public relations ploy, window dressing to pacify domestic or foreign states, when governments and their industries have really only wanted to continue business as usual".[360]

(D) Unilateral Legislation

Although article 209.2 of UNCLOS III, only permits states

to adopt laws for environmental protection in the seabed within their national jurisdiction, the U.S.,[361] U.K.,[362] France,[363] West Germany,[364] and U.S.S.R.,[365] have all proceeded to pass legislation purporting to regulate all types of seabed mining for their citizens. They all purport to be temporary measures pending when an acceptable international regime is found. A look at all these legislation will reveal that environmental concerns were hardly seriously considered. Their principal objective was economic development. Only the U.S. Hard Minerals Act made some serious attempts at environmental control. Even then, it is not clear why jurisdiction to oversee the Act was given to the Department of interior, and not the Environmental protection Agency, which has substantial expertise on environmental issues. Neither is it discernable why the coast guard is not charged with enforcing the regulation as with other pollution of U.S. waters. It is also not clear whether the Act covers only lifting of nodules or includes its processing. Furthermore, the Department of Interior's promotional function may conflict with its regulatory function.

The effectiveness of unilateral legislation for environmental protection of shared resources may be questioned on the following grounds; (a) the shared nature of the ocean environment discourages unilateralism, as unilateral legislation may interfere with the legitimate interests of other nations; (b) it may be a disguised vehicle for satisfying

a coastal states territorial desire, by including matters totally unrelated to the marine environment; (c) will be difficult to enforce, especially where there are several such legislation; and (d) usually focusses solely on the interest of the legislating state.

The present international arrangements may not be perfect but it is further undermined by unilateral legislation. As Richard Falk observes "from an economic perspective, the political fragmentation of mankind into separately administered states makes no sense whatsoever. The basic ecological premise posits the wholeness and interconnectness of things... there is need for a central guidance of human activities".[366]

Our review of the existing legal regime shows that it is deficient because of the lack of a generally accepted framework or structure of legal principles flexible enough to deal with the full range of marine pollution problems and "defining comprehensively and with greater particularity the powers and duties of states in all matters of marine environmental protection".[367] We shall volunteer some suggestions in the next chapter to fill this void.

CHAPTER IV

Conclusion

The seabed remains an intriguing topic. It exhibits superb complexity in all its ramification - either in its geophysical, ecological or legal contexts. The uncertainties pertaining to its mineral wealth and legal status add to its enigma.

Our discussions so far clearly demonstrate that the deep seabed shot into prominence solely because of its economic potentials. Current international legal controls of the marine environment, especially the seabed, are inadequate and incomplete in scope, and inconsistent and fragmentary in substance. The need for a more systematic and uniform means of environmental control cannot be overemphasised. To this end, the following goals must be pursued urgently; (a) the development of an acceptable international standard for exploitation of the sea; (b) workable enforcement procedure; (c) development of eco-system-based exploitation and conservation practices; and (d) the avoidance of destructive exploitation.

In formulating the specific environmental rules for the deep seabed the emphasis should be on preventive measures because restoration of the environment after an accident might prove either impossible or take very long periods of time. The goal should be the maximization of benefits from resources at minimum environmental cost. This will in GÜnther Handl's words

involve "balancing pollution damages against the alternative abatement and regulating costs to reach the optimal level of environmental and resource protection".[368]

The Preparatory Committee responsible for formulating the environmental rules of the deep seabed must ensure that the rules are fair and reasonable. They must not be too stringent as to kill the industry itself. The procedures and penalties should give no room for discrimination on the basis of nationality, region, ideology, etc. It follows that there must be broad consultations and accommodation of the diverse interests of states. Such a system will ensure broad support and compliance.

The judicial or administrative proceedings must be expeditious, complete with efficient monitoring mechanisms. Furthermore, compliance must be mandatory, unlike IMO rules, which depend on the bona fides of flag states actions.

To meet all these requirements the rules must ensure that; (a) all exploration and exploitation activities, and all deep drilling, are conducted with strict and adequate safeguards for the protection of human life and safety and of the marine environment; (b) protect living marine organisms from damage arising from exploration and exploitation activities, e.g. by the creation of special areas where no activities would be permitted because of their nature, either because of fragility or some other consideration, like concentration of aquatic animals or life supporting plants; (c) prevent or reduce to

acceptable limits, interference arising from exploration and exploitation activities with other uses and users of the marine environment; (d) assure safe design and construction of fixed exploration and exploitation installations and equipment; (e) facilitate search and rescue services, including assistance to aquanauts and the reporting of accidents; and (f) regulate waste disposal.[369]

Specifically the rules must ensure that an applicant meets a set of environmentally-oriented prerequisites. For instance, an environmental impact statement or report could be required before any license is granted. Such a report could be modelled after the United States' National Environmental Policy Act.[370] Section 102(2) of the Act requires an impact report or statement to contain; (i) the environmental impact of the proposed action; (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented; (iii)alternatives to the proposed action; (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and (v) any irreversible and irretrievable committment of resources which should be involved in the proposed action should it be implemented.

Such a report would satisfy, (a) the world's desire for environmental protection by including environmental cost into the process of mining, (b) would enable administrator's take impact reports into account in determining whether or not to

grant a license, or as A. Utton puts it "... would contribute greatly to assuring that "all relevant factors" are in fact considered at an early stage";[371] (c) sustained practice could create precedents for future projects; (d) could lead to wider studies of environmental consequences of deepsea mining; and (e) could become a standard for pinpointing responsibility in the event of a breach.

The report would be especially useful with regard to waste disposal. The applicant must be able to show how it intends to dispose waste. If it intends to dump it into the sea, the statement must show the likely short and long-term effect(s) on the marine environment. It must reflect the volume, concentration, chemical components and location of the materials.

A new environmental law of the deep seabed must also clarify the standard of proof required in an action. Improved general environmental consciousness would apart from anything else demand a modification of the existing standard of proof. Kirgis suggests that a modified standard is part and parcel of community expectation for the international decision-making process relating to transnational hazardous activities.[372] The peculiarity of environmental damage makes it impossible to discuss damage in the pigeon-hole of cause and effect relationship. Scientific assessment of the effects of some activities are complex, and more often than not produce controversial findings. While tort law may serve as a guide in

environmental causes, some of its principles are often inadequate. This is because environmental cases often present a dilemma - unlike most torts which involve unlawful activities, environmental matters usually concern activities which are not per se undesirable, but are in fact socially useful and desirable in their basic nature. Care must therefore be taken not to impose wholesale, tort concepts on environmental cases.

It is suggested therefore that the Law of the Sea tribunal should have the power to look at the totality of the activity involved and determine its reasonableness. In reaching such a determination, it should examine the manner in which the activity is conducted. Thus all physical features of the site, e.g. the topography, ecology, seismology, hydrology and population density should be considered. Other factors would include, the probability and magnitude of the harm and the interrelationship of risk elimination and exercise of reasonable care. All this essentially means a rejection of the "clear and convincing evidence" test of the Trail Smelter decision. From a preventive viewpoint, the better approach appears to be, that the likelihood rather than the actual existence of the injury be established by a balance of probability.

The right of private citizens to legal redress for injuries sustained as a result of activities in the area must be guaranteed. An international order that continues to focus

on states is obsolete. As in the field of human rights, the movement should be towards empowering and recognising individuals as units or bundles of legal rights in international law. State espousal of individual claims is inadequate for several reasons. It subjects the individual's right to redress to the political whims of the state. The victim's state's interest in maintaining friendly political and economic relations with the polluting nation may override the legal interest of the victim. Further, state claims are notoriously expensive and time consuming. For instance, the Trail Smelter dispute lasted all of thirteen years.[373] McCaffrey describes them as "needlessly circuitous and burdensome compared to private actions brought directly against polluters".[374]

Professors S. Roseanne supplies a sociological reason for preferring private right of action. He argues that "It is possible that the direct representation of the individuals concerned in the proceedings before the court would have the effect, not only of stimulating public interest in the work of the court, but also, and this may be important, of enhancing its prestige and public confidence in the reality of international justice".[375] It is conceded that the non-involvement of governments may leave the basic problems unresolved, as private parties may seek to protect only their own interests, leaving the broader common interests unrepresented. However, there is little doubt that increasing

the possibility of litigation by private action against the operators of mining sites would stimulate higher environmental consciousness on their part.

It has also been argued that the cost of litigation may discourage victims of small claims. While this may have some merit, it may also be the safety-net for discouraging frivolous suits and encouraging efficiency in litigation.

Allowing private actions is an idea whose time has come. As P. Jessup correctly observes, ensuring that international law is directly applicable to individuals is essential to a modern law of nations.[376]

There also has to be in place adequate post damage regulations. The Authority or Agency should be empowered to impose mandatory cessation of the wrongful activity until it determines that the offensive activity can be safely resumed.

The rules should also try to promote non judicial settlements through mediation and negotiation. This method is particularly important because litigation are often-times protracted and costly. A consensual dispute resolution procedure would be very valuable to an international regime like the seabed which will rely substantially on the goodwill of states.

The mediation procedure can be modelled after labour/management disputes. It must be noted however that environmental mediation and labour mediation present different difficulties. For instance in environmental disputes the

parties are more likely to be unfamiliar with mediation procedures. It would therefore be necessary to familiarize them with the procedures. Furthermore, environmental disputes unlike most labour disputes, almost always involve two or more parties, which could include governments, industries etc. parties to an environmental dispute are more likely to have divergent interests and priorities than labour groups. Some may only be interested in compensation, while others maybe more interested in abatement and restoration.

Despite these differences, mediation in labour disputes should provide a guideline. For instance it is important that the integrity of the mediator be beyond reproach and that there appears to be a balance of power between the opposing sides. This will ensure that undue pressure is not brought to bear on the weaker party. The mediator's role should be to seek a solution agreeable to both parties, and not to impose one. The issue of compensation has to be specifically addressed. The amount of compensation payable should be determined by the Law of the Sea tribunal or any other method agreed upon. Relevant factors such as the extent of the damage and culpability of the operator should be taken into consideration. It is suggested that a contingency fund for compensation be set-up to which all operators and the seabed authority will contribute. The operators could in lieu of such contribution be asked to post indemnity bonds or take out adequate insurance. The value of such insurance or bond should be determined by the authority

taking into consideration the potential pollution hazards of the operation. There should also be a limit to the liability of the operators. These regulations can be modelled after the convention on civil liability for oil pollution damage resulting from exploration and exploitation of seabed mineral resources.[377] The Convention's main purpose is to ensure that in the event of transboundary oil pollution from an offshore installation, the victims will be able to receive compensation by virtue of a guaranteed remedy against the operator of the installation or its insurer.

As we saw earlier, enforcement has always been the nadir of international law. The absence of a mandatory adjudicatory system has been largely responsible. To ensure that UNCLOS III and subsidiary legislation are effective, the ratification of the treaty should be made a condition for operation in the international area. The Seabed Tribunal must have compulsory adjudicatory powers. Party states must undertake to ensure that the provisions of the convention and subsidiary regulations are obeyed by those operating in the seabed under their flag. There should be provisions empowering the General Assembly of the United Nations to apply political and other pressures against defaulting states. The effectiveness of this remedy is however seriously circumscribed by the very divergent political considerations that will undoubtedly go into making such decisions.

In the alternative, it may be suggested that the

regulatory agency be automatically granted legal personality by a state as soon as it ratifies the treaty. Although this will enable the regulatory agency institute action in national courts, it too may run into some difficulties. This is because municipal courts often decline jurisdiction over incidence taking place outside their national boundaries. A case may however be made for the assumption of jurisdiction by municipal courts solely on the grounds of nationality of the defendant. It is however doubtful whether this is acceptable in environmental cases. Perhaps a more effective remedy will be to empower the Seabed Authority to withhold and if necessary confiscate a defaulting state's profit entitlement derivable from seabed operations. Such withheld profits can be used to compensate injured parties and restoration of the environment. This power must not however be exercised arbitrarily. Parties must be heard and there should be opportunity for challenging the authority's decision before a tribunal.

These problems further emphasize the need for international cooperation, because the institutional arrangements for effective environmental seabed management will in the final analysis depend on the political will of states to make it succeed. The international seabed authority as presently constituted cannot be effective, because there will be inevitable conflict of interest between its development and commercial responsibilities on one hand and its responsibility for conservation, assessment and regulation of the environment

on the other. To avoid this conflict, a bureaucratic separation of its commercial and regulatory functions, with each as independent units, is advocated. The bureaucratic unit should retain the name International Seabed Authority, while the regulatory arm should be known as the International Seabed Regulatory Agency. The agency should have both regulatory and enforcement powers. The regulatory unit, should have the power to supervise, inspect, fine, suspend or terminate the activities of all operators, including the Authority's enterprise, for violations. Non economic interests should be represented in the decision-making process of the unit. It must be independent of states as a necessary extension of the Common Heritage of Mankind principle. However, it will be desirable for it to make adequate consultations before regulations are passed. Non-governmental organizations likely to be affected or interested should also be consulted. There should be provisions for challenging the authority's decisions.

The Law of the Sea Tribunal and other adjudicatory processes provided for by UNCLOS III, should have compulsory jurisdiction over all signatories. The experience of the I.C.J., where jurisdiction depends on the consent of states makes this a necessity.

The ultimate objective of the entire enforcement regulations should be to create a regulatory entity with "sufficient responsibility, authority, staff, funds and expertise to exercise the functions needed for maximum

protection of the marine environment".[378]

It is axiomatic that effective environmental principles, must be based on scientific principles, a goal attainable only by an adequate intelligent inputs into the decision-making process. It is emerges from our discussions that despite breathtaking advances in technology and its infinite capacity to alter the environment, our knowledge of the deep seabed environment is at best shallow. There is therefore an urgent need for increased scientific research of the seabed. These research should not be principally aimed at maximizing exploitation but environmental protection. It is gladdening to note that article 143 of UNCLOS III, mandates the Seabed Authority to "coordinate and disseminate the results" of marine scientific research and analysis, and similarly requires states to ensure development of programmes for the benefit of developing states with a view to disseminate the results of research and analysis which state parties have undertaken in the area.

Similarly art. 244 requires states and international organizations to "make available by publication and dissemination through appropriate channels, information of proposed major programmes and their objectives as well as knowledge resulting from marine scientific research".

To achieve the objective of these provisions, bodies such as the United Nations Environmental Programme (UNEP) and its International Referral System (IRS) should be effectively

utilised for detailed and sustained research on the deep seabed.

No system is eternal. Consequently, the new rules must contain in-built mechanisms for adjusting to changing circumstances. This is particularly important because seabed mining is still in its infancy and problems may arise in the future that were not anticipated by the rules. Articles 154 and 165 of UNCLOS III satisfy this need. Article 154 gives the Assembly the power to undertake "general and systematic reviews" of the overall operation of the international regime in the area. While, article 165(2)(g), empowers the legal and technical commission to keep environmental rules, regulations and procedures for the international area under review and to recommend to the council from time to time such amendments as its may deem necessary. If effectively used, these provisions could keep the law abreast of developments.

There is no doubt that the success of an international legal regime is seriously circumscribed by the reality of sovereign states. States and their tenacious claim of sovereignty is a political and legal reality that cannot be wished away. Transnational oceanic pollution, more than anything else serves to remind man that national boundaries are artificial and man-made-pollution respects no boundary. The intricate interrelationship of the ecosystem makes a global approach to environmental control compelling from both a scientific and organizational points of view. Individual state

action is unrealistic and hopelessly inadequate. As L. Caldwell argues "[n]ational interest, as defined by the heads of governments, has by no means always been consistent with the interests of the governed. It is hardly to be expected that it would be consistent with the earth as a whole".[379]

The only real choice therefore is international cooperation. A less militant assertion of sovereignty and a large dose of self-denial would be required. In this regard the "property" status of the deep seabed must be settled and accepted by all. The absence of an acceptable legal regime for the area apart from being a potential source of international instability, will also lead to a situation where the seabed is a free "no man's land" without control, thereby making pollution control and conservation impossible.

A complete reorientation of man's basic perception of himself and his relationship with the environment is suggested. Man must reassess his place in nature, not in the hierarchy of life, but his place in a physical environment in which he is but a co-occupant along with other species. He must alter his laissez-faire philosophy of exploitation and economic growth at all cost, to one that emphasizes rational development and conservation. In this he has no choice because if he transforms the ocean as he has done the land, his ability to continue on this planet would be severely limited. This is because all life on earth is dependant on a viable marine eco-system. The oceans provide our oxygen, water, food and

moderates our climate. Without them the earth would be a barren waste land.

It is acknowledged that the environment puts man on the horn of a dilemma - on one hand, his unity with it and the finite nature of resources, make it imperative that man minimizes waste and conserve resources; on the other hand, it is impossible to completely halt injuries to the environment because man's nature compels a certain degree of damage or exploitation. The choice however is not between ecological values and economic growth, but as Earle argues ecology is "economics - the economics of the whole planet's resources and their constant recycling, not just of those small parts we're accustomed to putting price tags".[380]

A more ecologically sound world public order depends largely on the reorientation of fundamental underlying community expectations. After all, every system in the final analysis depends on the collective will to survive. Effective public pressure, in light of common experiences (at least in the democratic world) do influence legislation and governmental actions. Stimulating public environmental consciousness will require the establishment of an effective public enlightenment campaign mounted by both government and non-governmental organizations. Bodies such as UNEP, the Study of Critical Environmental Problems (SCEP), Sierra Club, Friends of the Earth, etc., could be very useful in this regard.

The deep seabed is one of man's last frontiers, it must be

protected from the mindless exploitation that has characterized exploitation of other areas of the environment. The task before the world community is the avoidance of environmental disaster and the preservation of one of man's last common heritage. A legal regime that would achieve this Objective must be based on the principle that any environmental damage in the area will attract international liability. Specifically, liability must be absolute if the damage is caused by defective equipment. The regulatory agency must have the power to revoke the license of an operator who has been cited twice for safety violations, or whose insurance has lapsed. Detailed regulations on personnel training and safety, equipment design and rescue must also be put in place. In particular mining ships must be strictly regulated. The rules must regulate their movement, their tonnage, the amount of processing that can be carried out and of course their seaworthiness to serve as mining platforms in the high seas.

There must also be rules regulating post-disaster activities, especially clean-up and restoration. Companies must be required to show their preparedness to manage and contain environmental disaster.

Unauthorized dumping must be prohibited. Dumping procedures must be scrupulously enforced. The regulations should create dumping sites in areas where they are likely to cause the least environmental damage or interfere with other uses of the ocean. As a corollary research into safe disposal

of tailings should be intensified.

Individuals and other interested parties must be granted access to the seabed tribunal.

Seabed mining provides us a unique opportunity for once to place environmental interests if not ahead of, but at least at par with economic interests. Further, to demonstrate that global environmental problems can best be regulated and managed on a global basis. Finally, it affords us the opportunity to share global resources without recourse to competitive acquisition. The seabed then may represent the first tentative step towards a truly united world.

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