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OUR NAVIGABLE WATERS—

POLLUTTED AND OTHERWISE

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From the earliest colonial days, our navigable waters have served functions essential to the Nation's safety and economic well-being. Our bays and harbors, our Great Lakes, and our coastal and inland waterways are now used daily by thousands of commercial vessels, foreign and domestic, from ocean liners to tankers to barges to fishing boats. Naval vessels steam these waters, as do ships of the Coast Guard, the Corps of Engineers, and other public agencies. Recreational watercraft of all conceivable sizes also ply these waters—impressive evidence of our material prosperity.

As in other spheres of American life, the achievement of affluence has not been without expense to the quality of our natural environment. In and on the water, this cost is pollution. The threat to our navigable waters through pollution from vessels of all descriptions is a formidable one.

Clean Water. The Water Quality Act of 1965 (Public Law 89-234), now part of the basic Federal water pollution control law, was enacted "to enhance the quality and value of our water resources and to establish a national policy for the prevention, control, and abatement of water pollution." Congress unanimously passed the Water Quality Act and, under its provisions, for the first time, specific clean-water objectives became possible. Under it, the states were permitted to plan their own specific water quality goals and to set time schedules for cleaning up their waters. The new law was especially designed, in fact, to allow the many economic and social interests in the states to determine jointly how available waters could be shared to fulfill all their various legitimate needs: recreation and aesthetics, fish and wildlife, municipal water supply, industry, agriculture, and maritime navigation.

Once determined, the act calls for the states to submit their proposed standards, including criteria, plan and implementation, and enforcement, to the U.S. Department of the Interior—specifically, to its Federal Water

Pollution Control Administration (FWPCA)—for review and approval. Once approved by the Secretary of the Interior, the standards are legally enforceable by both State and Federal governments. Enforcement of standards by either authority applies only to *interstate* waterways, however. (Federal law offers a financial bonus grant incentive for treatment works discharging into waters for which standards have been set, whether *intra* or *interstate.*)

Water quality standards include three essentials:

1. Water Uses. As required by the law, the states held public hearings to determine water uses desired for and appropriate to each stretch of their interstate and coastal waters. In most cases, several desired uses applied to the same stretch of water. Standards were set so as to permit the highest agreed use, thus requiring other users to bring their waste treatment up to this standard. After the hearings, state pollution control officials made the final decision.

2. Criteria. Once uses were chosen, state authorities, in consultation with scientists, engineers, and other water experts, decided what substances and how much of each the waterway could absorb—and still be fit for the desired uses. These limits (in the act called "criteria") are expressed in terms of ranges or critical levels for such as suspended solids, heat biochemical oxygen demands, coliform count, toxic material, et cetera.

3. Implementation Plan. After deciding uses and scientific criteria, state pollution control officials and technical experts surveyed municipal, industrial, and other wastes flowing into the waters to decide what type of treatment these wastes required to protect or improve the receiving waters. Then the authorities developed specific, detailed plans to produce the desired water quality.

Municipal and Industrial Wastes. The most common means of pollution control consists of a system of sewers and waste water treatment plants. The sewers collect waste water from homes, businesses, and many industries and deliver it to treatment plants designed to make it fit for reuse or discharge into receiving streams. Man-made treatment processes may be mechanical, biological, or chemical in nature. In each case they speed up the natural processes by which water purifies itself.

Primary treatment, a mechanical process, removes solids which will float or settle out of water. Called clarification or sedimentation because it "clears" the water of some of its turbidity (cloudiness from suspended solids), primary treatment is the first step. If the waste water is then to be discharged directly to a receiving stream, the last step is chlorination to reduce the number of disease-causing bacteria in the water. Primary treatment removes only about 40 percent of the organic matter in waste water. The resulting effluent, if discharged to a stream, may still cause great harm. For example, the effluent may use up most or all of the stream's oxygen supply just to decompose the remaining waste.

Secondary treatment is a biological process which duplicates nature's purification method by using bacteria to decompose organic matter in the waste water. More bacteria are used, and conditions are controlled, however, to speed up treatment. Secondary treatment can remove an additional 40 to 50 percent of the original organic matter in the waste water, giving an 80 to 90 percent efficiency for a primary-secondary plant. The final step in secondary treatment also is effluent chlorination.

Tertiary treatment is necessary in large metropolitan and/or heavily industrialized areas. Tertiary treatment, essentially a chemical process, assumes the primary-secondary steps but goes

beyond them. It may include chemical treatment in the following sequence: coagulation-sedimentation for additional solids removal (and over 90 percent reduction of phosphate concentration); filtration to remove all remaining turbidity, and absorption to remove over 98 percent of the organic matter which resists normal biological treatment. If a reduction in dissolved salts is required, electrodialysis may be the final step. Electrodialysis is generally used only if the water will be reused for municipal or special industrial purposes. With complete treatment, these further steps can remove an additional 9 percent of the original organic matter remaining, bringing total efficiency of the combined methods to 99 percent.

Obviously, none of these three processes stand alone. They must be used in combinations designed to handle each particular pollution control situation.

Properly planned, these processes can produce any degree of pollution control desired. Water produced after full treatment is of a quality suitable for any desired reuse—including water for drinking.

Other Effluents. Thus far, we have dealt with measures directed primarily towards conventional wastes such as domestic sewage or pollutants generated by industrial processes. As these wastes come under control, the more diffuse sources will increase in relative significance. Water quality deterioration resulting from such sources as spills and wastes from ships and other vessels will become more noticeable. It is these nonpoint marine-related sources which are here referred to as other effluents.

There necessarily will be wide variations among other effluents in the time and manner in which their control will be required. In contrast to conventional forms of pollution for which standards require specific remedial actions within specified time periods (generally over a 5-year period), standards are less specific with regard to these nonpoint sources. The fundamental difficulty in developing water quality standards to cover other effluents is that to date there has been little effort to quantify the pollutional effects, the cures, and the prevention costs associated with such problems.

Wastes from Waterborne Vessels. In the light of the Nation's stated resolve to restore and enhance the quality of our water, we cannot afford to ignore the wastes which issue from our waterborne vessels. Indeed, logic alone demands that both efforts proceed in tandem. The ports, estuaries, straits, and channels which see heavy maritime traffic usually are located in areas of heavy population concentration. It makes little sense to expect cities and industries along these waters to clean up their own waste discharges only to have the water remain polluted by discharges from watercraft.

The problem is widespread. Vessels, mobile, may trigger local pollution at any point along their path. Tank and freight ships are larger than they used to be. So are barges. They carry more varied cargoes such as chlorine gas, crude oil and its refined products of gasoline or oils, organic chemicals and pesticides which, if spilled, persist for long periods of time to poison fish and change the whole ecology of a river, estuary, or lake. Many commercial fishing vessels are now designed as floating canneries; both canning wastes and crew sanitary wastes are discharged directly overboard wherever they operate.

A recent (1967) FWPCA study of the pollution resulting from watercraft in the navigable waters of the United States—the only one available—has produced the following findings:

1. Approximately 46,000 documented commercial vessels, 65,000 nondocumented commercial fishing vessels, 1,500 Federal vessels, and eight million recreational watercraft use the navigable waters of the United States. In addition,

about 40,000 foreign ship entrances are recorded each year for these waters.

2. The pollutants that are routinely discharged from vessels, and which degrade the waters to which they are discharged, include sewage, oils, litter, bilge water, ballast water, wash waters, and chemicals. There are also accidental cargo spills. Sewage may contain dangerous concentrations of pathogenic organisms that cause diseases such as dysentery, shigellosis, typhoid or paratyphoid fevers, gastroenteritis, and infectious hepatitis. Ballast waters may contain oils and may be grossly polluted, dangerous to public health, and highly objectionable in appearance and odor.

3. Vessel sewage is discharged to waters of the United States from commercial vessels, both United States and foreign, at an estimated rate (occupancy rate) equivalent to 199,000 persons; from federally operated watercraft, 144,000; and from the perhaps 1,300,000 recreational watercraft which are toilet equipped, 170,000. This estimated total waste discharged from all watercraft—which may be somewhat high—thus in any case approximates the wastes from a city of 500,000 people.

4. In most instances, untreated sewage is discharged from watercraft just as it has been since the beginning of navigation.

5. Watercraft pollution can thus be a serious economic and health threat to many water-use areas in the United States. Ships and boats may defile such critical areas as those used for body contact water sports, drinking water supplies, shellfish beds, and recreational lakes where organic wastes and nutrients foster algal nuisances and accelerate eutrophication. Such pollution can be grossly offensive and may adversely affect shoreline real estate and other property values.

6. Beyond these most flagrant on-the-scene abuses of the waters, pollution caused by vessels is often transient. Raw sewage and ballast water may be disgorged by a commercial vessel on the high seas today, only to foul the bathing beaches of Cape Cod, Miami, Galveston, or Big Sur tomorrow.

7. Some 279,000 persons serve aboard the 1,500 federally operated watercraft. Generally, these 1,500 watercraft do not have pollution control devices. As in the case of other sources of pollution, the Federal establishment has a special responsibility to show leadership by establishing effective programs to remedy this situation.

Local estimates of pollution by human wastes from all waterborne vessels range from 0.2 percent of the drainage basic population to as high as 1 to 5 percent in certain locations. But these are just averages. The threat from recreational watercraft, for instance, is concentrated on weekends, holidays, and at vacation periods. Thus, while the average pollution potential of just recreational watercraft is approximately equal only to that of a city of 170,000 people, the pollution potential on a foul winter's day during the middle of the week may be almost zero, and that on a fair holiday weekend during the summer may be many times greater. Pleasure craft congregating for a weekend's fun may suddenly impose a load of untreated wastes equivalent to that of a good-sized town, and this in one small area.

Harbors, lakes, and other heavily used navigable waters differ, of course, in their physical and hydrographic characteristics and, in turn, in their characteristics from the pollution control standpoint. A narrow-necked harbor, for example, may vary greatly from a relatively open bay or a wide estuary in terms of capacity to assimilate wastes without adverse consequence to other beneficial uses. In given areas, therefore, vessel pollution may assume critical importance at an early stage; on other areas vessel pollution may be hidden by other discharges or so dispersed by tid-

and current that it appears to be less critical. But the problem remains.

Oil Pollution. The problem of water pollution from oil spills and its destructive potential was dramatized by the *Torrey Canyon* disaster in March 1967, when that tanker ran aground off the coast of England, spilling into the seas the 119,000 tons of crude oil she was carrying. Oil spills, as well as the careless or accidental release of other hazardous materials to streams or in coastal areas, have long been of concern to water pollution authorities. The results can be serious: fish kills and harm to other marine wildlife; major aesthetic (and economic) damage.

Oil pollution arises from many sources. Major sources include ships and other vessels, pipelines, shoreside facilities (terminals), and offshore oil rigs. Coping with these largely accidental pollution incidents requires an extensive surveillance program, alerting systems, reaction capability, and a contingency fund for cleanup purposes.

Cleaning up an oil-contaminated area is time consuming, difficult, and costly. The British Government, for example, reportedly is trying to recover $8 million from the owners of the *Torrey Canyon* for cleanup costs. This does not take into account the cleanup costs to local governments and private agencies. The eventual real cost may reach $25 million. The total direct costs of cleaning up and of preventing our own oil pollution problems have not been worked out, but an oil spill is enormously expensive. The indirect costs—whether commercial, recreational, or aesthetic—are difficult to estimate but they unquestionably are also tremendous.

Oil slicks move under the influence of wind and current. Wind is the dominant factor with fresh spills on open water. Such a slick usually moves at a speed of 2 to 4 percent of the wind velocity and, in the Northern Hemisphere, slightly to the right of the direction in which the wind is blowing. In the Southern Hemisphere, the movement is to the left of the wind direction. In the absence of wind, in places such as rivers, and perhaps for older, heavier spills, current will tend to exercise greater control of a slick's movement.

A rough estimate of the amount of heavy oil on the water can be made from the appearance of the slick. A barely discernible slick indicates 25 gallons per square mile (gpsm). A silvery sheen indicates about 50 gpsm. Faint colors in the slick indicate 100 gpsm. Bright bands of color indicate 200 gpsm. At a concentration of 600 gpsm a slick turns a dull brown. A dark-brown slick indicates 1,300 gpsm.

Large crude oil slicks sometimes combine with water to form a gelatinous emulsion called "chocolate mousse." The mixture may be as much as 70 percent water. Sea agitation of some types of crude oil will create this water-in-oil emulsion.

When "chocolate mousse" is deposited on a beach it tends, because of its sticky consistency, to stay on the surface of the sand. Oil, on the other hand, depending on its consistency, may penetrate the beach. In either case, cleanup usually involves physical removal—although the deeper the oil penetrates the sand the more difficult the cleanup problem becomes.

A short composite summary of the priority of attack on oil spills—actual or potential—runs as follows:

1. Salvage of the ship (if one is involved) or at least as much of her cargo as possible. Otherwise limit the spill at the source. After this, as necessary:

2. Containment of what has spilled by use of static and towable booms or other barriers.

3. Removal of the oil from the water surface by physically picking it up (skimming or pumping) or by sinking,

burning, or chemically dispersing it.

4. Shore cleanup, using straw, sawdust, polymers, or other sorbents; perhaps chemicals; and/or variety of engineer equipment to adsorb/absorb, wash, sandblast, burn, steam, and scrape.

An important factor in almost any oil spill is the potential fire hazard. Distilled petroleum products, such as gasoline, benzene, and naphtha are the most flammable. These lighter petroleum products spread quite rapidly on water and, because of their high volatility, evaporate quickly. In open water, where no fire hazard is involved, wind and water action usually result in reasonably fast dispersal and no cleanup action need be taken. Near a tanker, pier, terminal area, or other location where the fire danger is serious, spills of such products are usually contained and fire-preventive foam spread on the surface of the slick. Subsequent evaporation removes the slick. The foam returns to a liquid state and it dissipates. Alternatively, chemical oil dispersants may be applied, for safety.

Heavier oil products rarely present as serious a fire hazard since their higher ignition point makes them more difficult to set ablaze. After a short period on the water, crude oil is difficult to ignite and attempts to burn off crude slicks in the open sea are usually unsuccessful. The volatile fractions evaporate, leaving a heavy, sticky residue. This residue—gluey, persistent—is a prime pollution offender, however.

The Federal Effort. In September 1968, the five Federal agencies most concerned with oil pollution—Interior; Transportation; Defense; Health, Education, and Welfare; and the Office of Emergency Preparedness—published a jointly agreed to National Multi-agency Oil and Hazardous Materials Contingency Plan. Under this plan, all significant spills are monitored and reported. Where other Federal response actions are required—because no one else can or will take the proper measures—they will be taken.

A Federal spill response can be divided into five phases, elements of any of which can be concurrent:

1. Discovery of the spill, notification by whatever means, and classification.
2. Containment and countermeasures, as appropriate and when necessary.
3. Cleanup and disposal of the pollutant, avoiding further damage to the environment.
4. Long-term restoration of the environment, insofar as practicable.
5. Recovery of damages and law enforcement; costs will be recovered from the spiller and legal penalties will be imposed.

Under this plan, as amended, for most spills on our navigable waters except those caused by U.S. public vessels or federally-controlled facilities, the U.S. Coast Guard will provide an on-scene commander who initiates and directs all Federal response actions. (The exceptions—the Navy, for instance—provide their own on-scene commander.) In general, however, the spiller himself will be encouraged to take the corrective action and actually carry out the cleanup, under supervision.

The Coast Guard as well as the Navy and other Federal maritime agencies are also already taking measures to clean up their own problems. Extensive research is being devoted toward the development of adequate onboard sewage disposal systems for all sizes of ships, large and small. At all shore facilities where required, i.e., where the facilities cannot be tied into regular municipal sewage systems, sewage treatment plants are being installed. Intensive education and training aimed at pollution prevention is being undertaken, especially in those areas involving the handling of oil. The rest is a matter of time, money, personnel, and authority.

Other Measures. Three areas of marine-related activity not yet touched on—all of them technical in character—have considerable potential for helping prevent, control, and/or abate further pollution of our waters; all are receiving attention:

1. Ship design and construction. Such factors as the location, dimensions, and structural protection of a vessel's oil compartments: the size, freeboard, speed, stability, and maneuverability of a vessel; and even the location of the wheelhouse are important to accident prevention and spill minimization. The larger the tanker, the greater the threat, for instance. Various features of ship construction are already subject to control by government, industry, and the insurance-connected classification societies.

2. Ship movement. The best of individual ship navigation practice by properly trained and licensed masters and crews; the exercise of more positive control over the movement of oil and hazardous cargoes; the development of new and the expansion of existing recommended ship traffic lanes, at least in congested areas; and the establishment of some form of shore-based maritime traffic guidance system would all work to increase ship safety.

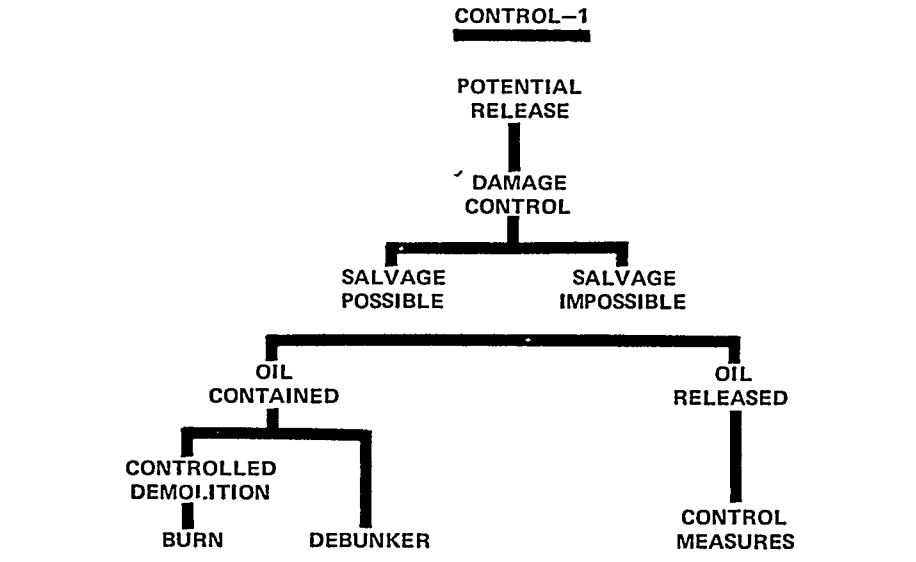
3. Cleanup capability. The methods and hardware required for an adequate overall spill cleanup system have yet to be developed. Our spill cure capability is much better in quiet waters than in open sea, but both areas require improvement. Extensive research and development is underway by both Government and industry.

The Coast Guard thus plays a major role in the detection, investigation, and reporting of marine pollution violations, cleanup of oil spills when required, and surveillance both for enforcement and cleanup purposes. It establishes merchant vessel design safety standards, carries out merchant vessel safety inspections, documents and licenses merchant personnel. It establishes navigation procedures. It is responsible for research and development to prevent and "cure" offshore spills. It also helps formulate area contingency plans, organizing local responses to potential marine pollution incidents. For each of these tasks the Coast Guard is well qualified by its personnel, material resources, and experience.

Conclusion. The need to control the excessive and mostly unnecessary pollution of our navigable waters has been before the public for some years. Most of the means required to stop this degradation of our water and to begin enhancing this resource over the total range of beneficial public uses are now either in hand or can be secured through legislative and other measures. Much new legislation is in fact being enacted.

Marine-related pollution is just one of the sources of the problem, but nonetheless a significant one. Oil, sewage, litter, and other marine wastes will receive ever increasing pressure now and in the future. Spills will be avoided, or fought.

This all means that our waterways should become gradually cleaner over the next 5 to 10 years, with improvements showing by 1972. It is not too soon.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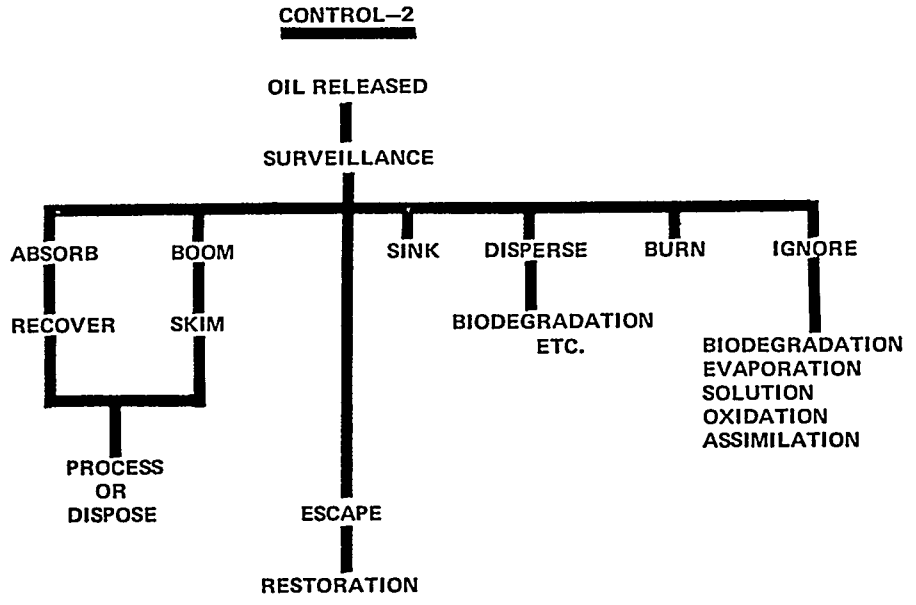
CONTROL–2
OIL RELEASED
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EVAPORATION
SOLUTION
OXIDATION
ASSIMILATION
PROCESS OR DISPOSE
ESCAPE
RESTORATION

Ψ

A LEGAL REGIME FOR THE RESOURCES OF THE SEABED AND SUBSOIL OF THE DEEP SEA: A BREWING PROBLEM FOR INTERNATIONAL LAWMAKERS

Horace B. Robertson, Jr.

INTRODUCTION

In the Fall of 1967, in the Twenty-Second Session of the United Nations General Assembly, the Representative of Malta introduced a Resolution which called upon the General Assembly to take up a treaty which would reserve the deep ocean bed and its resources to the United Nations to be exploited for the benefit of the underdeveloped countries. This Resolution was placed on the agenda and was debated in Committee I and in the Assembly. Although the General Assembly did not approve the Resolution *per se* but instead created an *Ad Hoc* Committee to study all aspects of the matter and to report to the Twenty-Third Session, the fact that it was even brought forward at that time came as a surprise to many.

The emergence of the seabed of the deep ocean as a problem for international decision makers was sudden and dramatic. Less than 10 years earlier a United Nations Conference on the Law of the Sea had considered the problem remote. Even today man's activities on the floor of the deep ocean are miniscule, and the commercial exploitation of the resources of the seabed and subsoil beyond the continental shelf still remains for the future. Why, then, has the legal status of the deep ocean bed

become of such international concern that it is discussed today within the United Nations? Is the problem of such urgency that it merits such attention? If so, what is the framework within which solutions may be found?

It is the purpose of this paper to explore these and related questions. The approach to the problem will be, first, to examine the technological developments of the last few years, and those promised for the next few, which have catapulted the issue to prominence. Then, after an examination of the current status of the law of the sea, particularly as to its applicability to activities on the deep ocean floor, the paper will examine the types of seabed activities which are projected for the future in order to establish a basis for determining the elements of a possible regime for the deep ocean bed and subsoil. This will be followed by an examination of several alternative regimes which might have applicability to the seabed as well as possible procedural and political methods by which a regime might be brought into being. The interaction between the political, legal and technological factors will form the basis for tentative conclusions, with particular emphasis on the courses of action open to the United States in shaping a regime which would be favorable to United States interests.

I--THE PROBLEM EMERGES

Recent Expectations on Exploitability of the Deep Ocean Floor. In January 1958, in a paper prepared by the Secretariat of the United Nations as a preparatory study for the 1958 United Nations Conference on the Law of the Sea, it was stated that it was probable that oil exploitation of the continental shelf would ultimately be conducted in waters as deep as 200 meters.[1] The paper predicted that undersea technology might advance rapidly enough to permit such exploitation to occur in as short a time as 20 years. With respect to the resources of the deep ocean bed, the paper was more pessimistic. It stated:

> In view of a certain fear of an ever outwards-moving boundary line of the legal 'continental shelf' an inquiry was also made into the question whether the ocean floor contains any exploitable minerals. The answers indicate that the sediment carpet covering most parts of the ocean floor does not contain minerals in any concentrations worthwhile exploiting.
>
> In one plate manganese ore has been found, but since this is available on land in sufficient quantity, exploitation from the ocean bottom is not necessary and would not pay. The sediment carpet, being extremely thick will in most places make exploitation of layers underneath impossible. In the few places where the sediment is thinner or non-existent formations may be found with the prospect of exploitation. Intrusions, such as the Mid-Atlantic Ridge, might have mineral deposits associated with them. The depth will, however, be an insurmountable obstacle for exploitation for a long time to come, quite apart from the commercial prospects which seem non-existent.[2]

The conclusions in the paper reflected the consensus of scientific and technical thought at that time and serve partly to explain the complete absence of consideration by the 1958 Conference on the Law of the Sea of the legal status of the seabed and subsoil of the sea beyond the Continental Shelf.[3] But, like so many estimates and predictions in this age of rapid technological advance, the conclusions in that paper and those of the scientists and technologists upon whom it relied have proved conservative, and today, only 10 years after they were made, technology has already outstripped the developments predicted for 1978 or later.

Current Capabilities and Predictions of the Future. In 1966, *Business Week* reported that Humble Oil and Refining Company had used a remote-operated drilling vessel to install a wellhead at a

632-foot (192 meter) depth off the California coast near Santa Barbara.[4] That was a record at that time, but by October 1967, Global Marine, Inc., the commercial ocean drilling firm which sank the 632-foot well, was operating three commercial ocean drilling vessels capable of drilling oil wells to a depth of 25,000 feet in water depths of 1,000 feet (305 meters) and was reported about to put two additional vessels with similar capabilities into operation within a year.[5]

In the field of exploration and scientific research, in 1967 the National Science Foundation awarded a contract for obtaining ocean bottom cores up to 2,500 feet long in water depths of 5,000 to 20,000 feet.[6]

Probably the development that has stimulated the most interest in the possibility of commercial exploitation of the resources of the deep ocean bed is the discovery within recent years that vast areas of the ocean bottom are literally "paved" with manganese nodules. These nodules are mineral lumps found lying on the bottom of the ocean. Although their composition varies from location to location, they usually consist primarily of manganese, iron, nickel, cobalt and copper. Their origin is not fully understood, but it is generally believed that they result from the collection of colloidal particles of the various elements as they filter down through the water, the colloids of manganese and iron attracting those of nickel, copper, cobalt and the other metals.[7] Dr. John L. Mero, a leading expert on the techniques of undersea exploration and mining, has made a detailed study of the economic aspects of mining these nodules commercially using simple drag dredge techniques and has concluded that in depths of water up to about 5,000 feet the venture would be profitable.[8] In August 1967 the Newport News Shipbuilding and Drydock Company was awarded a patent on a vessel designed especially for mining manganese nodules.[9]

But the known resources of the deep seabed are not limited to manganese nodules. Phosphorite, a valuable plant nutrient, is also found in nodules on the seabed in many areas of the ocean, generally in depths of 600 feet to 5,000 feet.[10] One abortive attempt has already been made to mine a rich area a few miles off the California coast under U.S. Department of Interior license, but after extended exploration and trial dredging by the licensee, the attempt was abandoned because it was discovered that the bottom in this particular area was also sprinkled with thousands of torpedo and naval gun shells left as an aftermath of decades of use as a Navy target range.[11] Dr. Mero has also made detailed studies of the composition of the "oozes" which make up the sediment covering the majority of the ocean bottom, and has determined that, far from being worthless, they could provide an inexhaustible and commercially exploitable source of calcium carbonate as a substitute for limestone.[12]

Despite these heady predictions of things to come, it is nevertheless important to recognize that up to the present time, the only undersea mining that has been done commercially is limited to areas that are fairly close inshore and are geologically a part of the continental shelf. As a prominent mining engineer stated at a recent institute:

> ...I represent a group of practical mining people now engaged in undersea mining around the world for a number of different minerals and in a number of ways. As a matter of fact, after hearing the session at the Marine Technology Society the other day, we made the calculation that if only people who were *experienced* in the ocean talked at such meetings and they only talked about things they had actually done, instead of about what they propose to do, it would cut a three day meeting down to about an hour and fifteen minutes. There is a lot of rather wild speculation about under-

> sea mining, but there is some actually going on in the world.[13]

Uncertain Status of the Resources of the Deep Seabed. The promise of riches from the sea and the predictions of rapid technological progress toward achieving commercial exploitation of them at ever greater depths have caused increased attention to be focused on the legal status of the seabed and subsoil of the oceans beyond the continental shelf and on the mineral resources that may be extracted. Within the United States the most prominent individual who has sought to attract attention to the problem has been Senator Claiborne Pell of Rhode Island. In a book published in 1966 he stated:

> Because technology has not yet reached the stage of development when deep-sea mining is feasible, questions of who owns the deep sea floor have not been studied seriously. But technology will develop quickly, and for some minerals in short supply deep-sea mining may be worthwhile very soon. Is the deep-sea mineral wealth to be taken by the first comer? It seems likely, at least now. If a deep-sea petroleum rig strikes oil at a mile depth, can the rigs of other nations set up alongside and drill into the same pool? Such questions will not be academic for long.[14]

At the present time there is no answer to Senator Pell's academic questions. The 1958 Conference on the Law of the Sea adopted a Convention on the Continental Shelf which establishes the "sovereign rights" of the coastal state over the adjacent continental shelf for the purpose of exploring it and exploiting its natural resources.[15] The Convention defines the shelf as that area of the adjacent submarine area 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."[16] Beyond the limits of the continental shelf there is no accepted legal regime, and, in fact, only recently have legal scholars begun to think seriously about the problem.

Proposals for a Legal Regime. Within the United States, Senator Claiborne Pell has been in the forefront in proposing clarification of the regime of the deep seabed. On 29 September 1967 he introduced a Senate Resolution calling for the United States to take the initiative in obtaining an international agreement which would declare that the floor of the deep sea and the resources of the seabed and subsoil thereof, beyond the limits of the continental shelf, should be free for exploration and exploitation of all nations and incapable of coming under the sovereignty of any one nation or group of nations. The Resolution also called for appropriate arms control measures for the deep ocean and for the calling of a conference for setting the outer boundaries of the continental shelf of each nation.[17] On 5 March 1968 he introduced a second resolution which submitted a draft of a proposed Ocean Space Treaty.[18]

Within the United States, at least two other influential groups have made similar suggestions. In 1965 the Committee on Conservation and Development of Natural Resources of the White House Conference on International Cooperation proposed the establishment of a specialized agency of the United Nations similar to those established for atomic energy and civil aviation which would have the responsibility of leasing mineral rights in the sea bottom and for promoting the development of these resources.[19] In its 17th Report in 1966 the Commission to Study the Organization of Peace (the Research Affiliate of the United Nations Association of the United States of America) urged that the General Assembly should declare that no nation may appropriate the seabed beyond the continental shelf and recommended that the General Assembly set up a special agency, to be known as the United Nations Marine Resources Agency, to control and ad-

minister international marine resources; hold ownership rights; and grant, lease or use them in accordance with the principles of economic efficiency.[20]

On the international scene, the Geneva World Peace Through Law Conference of 1967 passed a resolution on 13 July 1967, recommending that the General Assembly issue a proclamation declaring that the nonfishery resources of the high seas, outside the territorial waters of any State, and the bed of the sea beyond the continental shelf, appertain to the United Nations and are subject to its jurisdiction and control.[21] Of more significance, on 17 August 1967, the Permanent Mission of Malta to the United Nations proposed that the General Assembly should, in its twenty-second (1967) session, take up a treaty concerning the reservation to the United Nations of the seabed and ocean floor and the exploitation of the resources thereof for the benefit of underdeveloped countries.[22] This item was included on the agenda for the twenty-second session and discussions were held in the Political Committee in November and December 1967. Primarily through the efforts of the United States and the Soviet Union, substantive action on the item was postponed by the device of appointing a Committee on the Oceans (patterned after the previous outer space committee) to study the proposal further and report to the twenty-third session.[23]

Thus, although action of the General Assembly has provided a grace period, the time for substantive decisions on the legal status of the seabed and subsoil of the deep ocean seems to be approaching.

Summary. The foregoing brief background suggests the growing importance of the seabed to the world community and the increasing attention it is receiving, not only from scientists and technologists, but also from national and international decision makers. In subsequent chapters, this paper will first review the current framework of international law within which or as an extension of which solutions to the problems posed might be found. It will then examine the current and projected activities on the deep seabed. With these as a basis, the paper will then examine several alternative regimes which might have applicability to the seabed as well as possible procedural methods by which a regime might be brought into being. Finally, tentative conclusions will be stated.

II--THE CURRENT STATE OF THE LAW OF THE SEA

As an initial step in attempting to explore a possible regime for the bottom of the deep ocean, it is necessary to examine the current status of the law of the sea, the regimes that apply to the various segments of the sea and the boundaries of those segments, with particular attention to the legal regimes applicable to the seabed and subsoil. Perhaps the most logical order for such a consideration is to look at the sea starting at the land and proceeding outward. Not unsurprisingly, as one proceeds outward from the land, and as the connection between the land and the sea becomes more remote, the law applicable on the land has less and less applicability to the sea, seabed, and airspace above the sea.

Internal Waters. The waters most close inshore are called internal waters. These waters are those enclosed within the baseline from which the territorial sea is measured. The baseline generally follows the low-water mark along the coast, but in some cases, such as the mouths of some bays and rivers and along coasts deeply indented or fringed by numerous islands, it may be a straight line following the general configuration of the coast. For internal waters, the sovereignty of the coastal

state is complete, not only as to the waters, but also as to the airspace above and the seabed and subsoil beneath. They are in the same legal status as the land territory of the state.[1]

The Territorial Sea. The next belt outward from the baseline is the territorial sea. It is a belt whose inner limit is the baseline and whose outer limit is the line every point of which is at a distance from the nearest point of the baseline equal to the breadth of the sea.[2] The Territorial Sea Convention explicitly declares that the sovereignty of the coastal state extends to this narrow belt. Such sovereignty includes the sea, the seabed and subsoil and airspace above.[3] Essentially the only difference between the territorial sea and internal waters is that the ships of foreign nations have the right of innocent passage through the territorial sea but do not have such a right in internal waters.[4] Aircraft do not enjoy a right of innocent passage through the airspace above the territorial sea.[5]

The 1958 United Nations Conference on the Law of the Sea codified a great deal of the international law pertaining to the territorial sea, but neither that Conference nor a similar Conference held in 1960 was able to obtain agreement of a sufficient number of participating states to establish a precise breadth of the territorial sea. The United States has always claimed a 3-mile wide territorial sea.[6] Most of the maritime states likewise claim such a narrow territorial sea. On the other hand, a great number of states today claim broader territorial seas--a number claiming 6 miles, quite a few 12 miles, and several extending their claims as far as 200 miles.[7] The United States has repeatedly stated that it does not recognize any claim beyond 3 miles.[8]

The Contiguous Zone. Proceeding outward from the territorial sea, the next belt is called the contiguous zone. The 1958 Territorial Sea Convention empowers a coastal state to establish such a zone beyond its territorial sea in which it may exercise the control necessary to prevent and punish infringement of its customs, fiscal, immigration, and sanitary regulations within its territory of territorial sea. It may not, however, extend beyond 12 miles from the baseline.[9]

It is to be noted that with respect to the contiguous zone, the coastal state does not exercise the full bundle of powers constituting sovereignty but only a limited control or jurisdiction. The waters of the contiguous zone are a part of the high seas. The airspace above them is free for the passage of foreign aircraft, and (except as indicated below as to the continental shelf) the coastal state has no special claim as to the seabed or subsoil.[10] Although a number of states, including the United States, have claimed exclusive fishing rights within the contiguous zone, such claims are not made on the basis of the Territorial Sea Convention but depend on the practice of states.[11]

The Continental Shelf. Although the geological continental shelf usually underlies the waters of both the territorial sea and the contiguous zone, it is considered after these two zones because its outer limit may extend beyond the boundaries of either.

Geologically, the continental shelf is the submerged extension of the continental landmass which slopes gently seaward from the low-water mark to a point where a substantial break in grade occurs. Generally, this break occurs at about 100 fathoms, but this is by no means uniform. The width of the continental shelf varies greatly. In some parts of the world, such as off the coasts of Peru and Chile, it may be virtually nonexistent. In other areas, such as some parts of the east coast of the United States and the Gulf of Mexico, it may be several hundred miles wide.[12]

Although the United Kingdom and

Venezuela entered into a treaty in 1942 by which they divided petroleum exploitation rights beneath the Gulf of Paria between them,[13] the event which had the most impact on the development of the law of the continental shelf was a Proclamation by President Truman in 1945 which declared 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 coast of the United States as appertaining to the United States, subject to its jurisdiction and control."[14] The Proclamation made no attempt to define or set an outer limit on the continental shelf. However, the press release accompanying the Proclamation stated, "Generally, submerged land which is contiguous to the continent and which is covered by no more than 100 fathoms (600 feet) of water is considered as the continental shelf."[15]

It remained for the 1958 U.N. Law of the Sea Conference to provide a legal definition and an outer limit of the continental shelf. Article 1 of the Continental Shelf Convention defines the continental shelf as the seabed and subsoil of the high seas adjacent to the coast to a depth of 200 meters or, beyond that depth, to where the depth of the superjacent water permits the exploitation of the natural resources of such areas. The coastal state is given "... sovereign rights for the purpose of exploring [the continental shelf] and exploiting its natural resources."[16] The convention explicitly provides, however, that the rights exercised by the coastal state over the continental shelf shall *not* affect the legal status of the waters above the shelf as high seas, or that of the airspace above those waters.[17] Thus, the coastal state's "sovereign rights" are restricted to the seabed and subsoil. Ships and aircraft are free to come and go in the waters and airspace above the continental shelf with essentially the same freedom as they have on other parts of the high seas.

The High Seas. All waters not included within the territorial sea or the internal waters of a state are high seas. The 1958 Convention on the High Seas specifically provides: "The high seas being open to all nations, no State may validly purport to subject any part of them to its sovereignty."[18] This provision must, of course, be read in context with the other articles of the Convention and with the Conventions on the Territorial Sea and Continental Shelf. These provide for the exercise of some of the elements of sovereignty by coastal states over certain areas of the high seas and over certain activities occurring on the high seas, as has already been seen. But it is safe to say that generally the regime of the high seas is one of freedom. The High Seas Convention specifically enumerates the following freedoms as appertaining to the high seas for all States, coastal and noncoastal: freedom of navigation; freedom of fishing; freedom to lay submarine cables and pipelines; and freedom to fly over the high seas. It also specifically states that this list is not exclusive. The Convention provides that the freedoms of the high seas are to be exercised by all states "... with reasonable regard to the interests of other States in their exercise of the freedom of the high seas."[19]

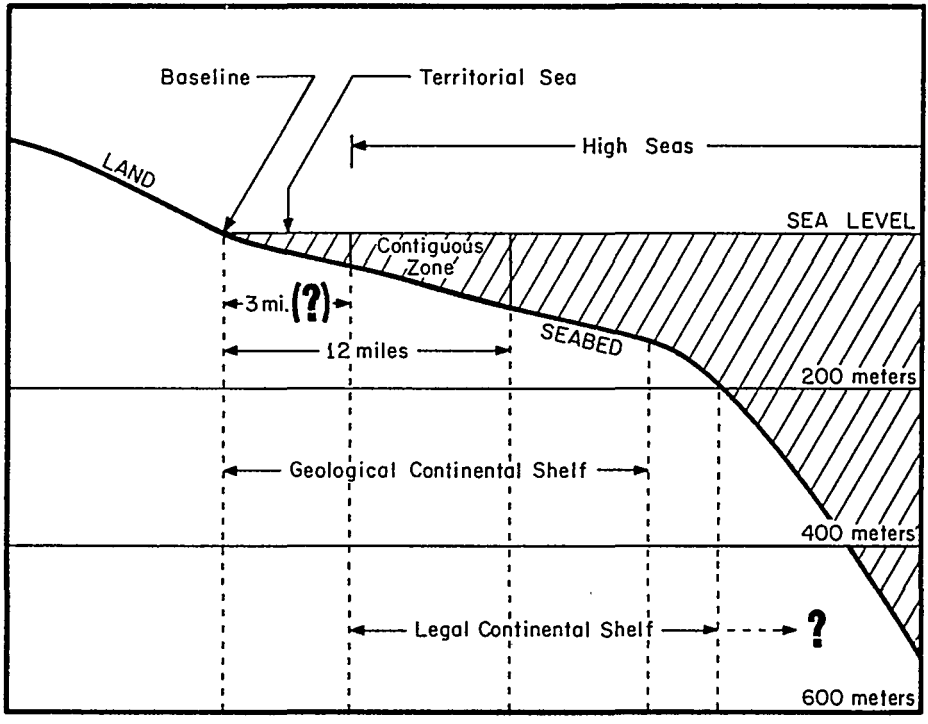
The freedom of the high seas is protected, not by the exercise of jurisdiction by a supranational body or by coastal states, but by the principle of the "flag state." Under this principle, persons who conduct activities on the high seas must operate under the flag of some nation, which is then responsible for and has jurisdiction over activities conducted under its flag.[20]

Except as to the freedom to lay submarine cables and pipelines, the High Seas Convention is silent as to the seabed and subsoil. Thus, beyond the edge of the Continental Shelf, about

which more will be said below, there are no provisions of treaty law applicable to the resources of the seabed and subsoil of the high seas. Since man's exploitation has to this date been essentially limited to the Continental Shelf, there is no practice of states sufficient to establish any customary international law on this subject.

Figure 1 depicts in visual form the divisions of the ocean already discussed.

Figure 1.--Legal Divisions of the Oceans



The Outer Limit of the Continental Shelf. Before proceeding to analyze possible alternative regimes for the seabed and subsoil of the deep ocean, it is necessary to consider one more preliminary issue. That is the contention, advanced by some, that such a regime already exists. The argument for this contention is based on the wording of Article 1 of the Continental Shelf Convention, which reads as follows:

> For the purpose of these articles, the term 'continental shelf' is used as referring (a) to 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.

The definition for the outer limit of the continental shelf is thus twofold. Either it is at the point at which the depth of water reaches 200 meters or, at the point beyond that depth at which the state of technological development at any particular moment permits the exploitation of the natural resources of the seabed and subsoil. Based on this second, flexible criterion for determining the outer edge, some have

argued that as technological advances permit exploitation of resources in deeper and deeper water, the boundary moves further and further to sea. According to proponents of this theory, the only limit to such extensions outward from the coastal state is the median line between opposite coastal states.[21]

This result, while having the facile attraction of simplicity and being in accord with the literal words of the Convention, does not appear properly to reflect the intent of the Convention. A brief examination of the background and negotiating history of the 1958 Convention will help in determining the true intent and meaning of Article 1.

The difficulty faced by the delegates to the Conference was that they were trying to provide a precise and certain legal definition for a geological concept which was not precise and certain. Additionally, as stated by the U.S. spokesman on the Continental Shelf Committee, "... the Conference was tinged with politics."[22]

The Conference had as a basis for initial discussion a draft convention developed by the International Law Commission (ILC) over a period of several years.[23] Mr. Garcia-Amador, the representative of Cuba and a noted international lawyer who was also a member of the ILC, pointed out that the limit of exploitability criterion was accepted by the ILC in 1951, dropped in 1953 and then readopted in 1956 as a result of the unanimous resolution passed at the Inter-American Specialized Conference on Conservation of Natural Resources: Continental Shelf and Oceanic Waters held at Ciudad Trujillo, Dominican Republic, in early 1956. He stated that the ILC draft text had both a moral and a legal basis in that it covered the needs both of countries with a continental shelf and of those whose adjacent submarine areas did not meet the currently accepted definition of the continental shelf but were nevertheless rich, exploitable areas. He pointed to Chile as one of the special cases brought to the attention of the ILC. Coral reefs off the coast of Chile were exploitable to depths of perhaps 1,000 meters and could not therefore be considered as part of the continental shelf in the accepted geological sense. "Nevertheless, it was only right that such cases should be taken into account, and the criterion of possible exploitation had been accepted with the object of doing justice to all states."[24] Thus, there is nothing in the history of the development of the draft convention by the ILC to suggest that the ILC conceived of the boundary as subject to limitless outward expansion. The problem they sought to meet by the exploitability criterion was rather the case of exploitable seabed resources in waters which, though close inshore, were deeper than 200 meters.

At the Geneva Conference the discussions of the ILC draft article which eventually became Article 1 of the Convention, the definition Article, developed into a debate between advocates of a fixed criterion and those who advocated the exploitability criterion. Although some delegates pointed to the possible danger that the literal words of the flexible exploitability criterion might lead to limitless outward extensions of coastal state jurisdiction,[25] the principal argument expressed by those who favored a single, fixed criterion was that the vagueness of the exploitability criterion would lead to disputes between states.[26] The adherents of the exploitability criterion based their view principally on three grounds, namely (1) the fact that a 200 meter depth did not necessarily define the edge of the continental shelf in a geological sense--in some areas the edge was at greater depths;[27] (2) the Garcia-Amador argument of justice for those coastal states which had no continental shelf in the geological sense;[28] and (3) the fact that in 1958 the continental shelves of the

world were largely unexplored and that it would be unwise to establish a fixed criterion for defining a geological phenomenon about which so little was known.[29] None of the adherents for this position suggested that they viewed the exploitability criterion as a basis for indefinite extensions of the "legal" continental shelf seaward.

The principle of "adjacency," which is included in the Article 1 definition, was impliedly recognized in the arguments of many delegates. However, only one speaker pinned this point down precisely, and although he was not expressly supported by representatives of other governments, neither did anyone express disagreement with the proposition he expressed. He was the delegate of the Dominican Republic, who stated:

> The thought underlying that Article was that the continental shelf was a prolongation of the land and, therefore, subject to considerations of contiguity or proximity. Exploitation beyond the point at which the relationship of proximity ended might be based on occupation, but it would not be covered by the provisions of Articles [1 and 2].[30]

Thus, although the record is not completely free from doubt, it seems reasonably clear from the history of the development of the Article 1 definition that the framers of the Continental Shelf Convention did not intend, by that Convention, to allocate the resources of the deep ocean floor among the coastal states of the world. This interpretation is shared by a number of scholars who have researched the subject.[31] Further, this interpretation is implicit in the current consideration of the subject in the United Nations. Otherwise, the United Nations would be engaging in a pointless debate on a subject which had already been resolved by the 1958 Geneva Conference.

Nonetheless, the boundary is imprecise and ambiguous. As a result, any program for the establishment of a regime for the deep seabed (other than coastal state jurisdiction) would have to have as one of its elements the establishment of a more precise outer boundary for the continental shelf.

It is the ocean floor beyond that boundary--whatever it may eventually be--with which the remainder of this paper is concerned.

III--SEABED AND SUBSOIL ACTIVITIES

In this chapter there will be an examination of the types of activities projected for the seabed and subsoil of the deep ocean, an appraisal of the United States interests in each of such activities, and an attempt to define criteria, based on each kind of activities, for developing a regime covering these activities.

Exploration and Research. Despite the fact that man has traveled on the surface of the sea since the beginning of recorded history and has used the sea as a source of food for perhaps even a longer period, he knows very little about the ocean depths and particularly the bottom of the sea. Man has photographed and mapped the back side of the moon 240,000 miles away, but he has explored only about 5 percent of the bottom of the seas which comprise 71 percent of the earth's surface.[1] For the foreseeable future, therefore, the most prominent activity with respect to the bottom of the deep ocean will undoubtedly be exploration and research. Such exploration and research are a necessary prelude to productive uses of the deep ocean floor.

The United States, as one of the leading users of the oceans for both peaceful commerce and national defense, has a preeminent interest in fostering exploration and research in the deep oceans. But only in recent years has that interest been given very great attention. Only a few years ago, ocean-

ography was an obscure scientific discipline practiced mostly at a few highly specialized institutions, such as the Woods Hole Oceanographic Institute at Woods Hole, Massachusetts, and the Scripps Institute of Oceanography at La Jolla, California. Even the Navy did not accord it a very prominent place as evidenced by the fact that until quite recently responsibility for oceanography was divided between several offices, the principal ones being the Office of Naval Research and the Navy Hydrographic Office. It was not until 1966 that the Hydrographer of the Navy, whose primary function had been the provision of charts and navigation publications to the Navy, was redesignated as the Oceanographer of the Navy and given full responsibility for coordination of the entire Navy Oceanographic Program.[2]

Today, however, the field of oceanography and related sciences are receiving much more attention. The oceans have become a "glamour" scientific and engineering subject. Between 1963 and 1967 total annual expenditures (government and private) more than doubled, rising from approximately $1 billion per year to an annual rate of over $2 billion.[3] The U.S. Government research and development programs took an even more dramatic jump--from $24 million in 1958 to $220 million in 1967.[4] Giant aerospace companies, some with no prior experience in the field, have suddenly taken an interest in it now that the government has allocated large research and development funds.[5] As a result of the intense and increasing concern that the United States should have a comprehensive and well-coordinated plan for exploitation of the oceans, Congress enacted the Marine Resources and Engineering Development Act of 1966.[6] This Act established the National Council on Marine Resources and Engineering Development in the Executive Office of the President to advise and assist the President in the planning and conduct of a coordinated Federal program in marine science and technology. Indicative of the importance attached to the program by the President and the Congress, the Council is headed by the Vice President and includes in its membership the Secretaries of State, Interior, Commerce, Health, Education and Welfare, Transportation, and Navy, the Chairman of the Atomic Energy Commission, and the Director of the National Science Foundation.[7]

It is thus apparent that the United States has now embarked on a comprehensive program of exploration and research in the oceans. Although no authoritative figures showing the percentage of the total oceanography effort which is devoted to exploration of the sea bottom are available, the emphasis which is being placed on deep diving submersibles indicates that it is large. Within the United States alone a great variety of deep diving experimental submersibles is already in operation and more are planned. Many of these are sophisticated manned vessels, capable of exploring the deepest portions of the ocean bottom and providing a great deal of information about it.[8]

Since research and exploration do not generally contemplate the construction of expensive bottom installations or the removal of large quantities of bottom material, most favorable for exploration and research would be a regime under which maximum freedom is preserved--freedom of access to all areas of the sea bottom, freedom to take samples of the seabed and subsoil, freedom to map and take photographs, freedom to construct temporary installations on the bottom, and the like.[9] The only desirable restriction is that those engaged in research or exploratory activities be protected from hazards, such as underwater collisions, jettisoning of objects from above, and fouling of working and safety lines.

Extraction of Mineral Resources. As has been touched upon in Chapter I, the excitement about the seabed and the interest on the part of some to internationalize it has been brought about by the discovery that the seabed (and perhaps the subsoil) is a potential source of valuable mineral resources. Although the extraction of such resources is so far essentially limited to the continental shelf and generally to the shallower parts thereof, any regime for the deep ocean bed must take account of the potential exploitation of its mineral resources.

The most interest has been excited by the manganese nodules which are found over vast areas of the ocean floor. Phosphorite nodules also hold the promise of early exploitation. Man's ever-expanding demands for new sources of raw materials may push him to exploit these much earlier than was thought possible only a few years ago. One observer has stated it thus:

> . . . while rising demand squeezes traditional supplies and pushes [raw material] prices up, a rapidly developing technology is pushing down the cost of working oceanic resources. Whenever these rising price and lowering cost curves cross, man turns to the sea.[10]

Dr. John P. Craven, Chief Scientist of the Navy's Deep Submergence Project and a prominent authority in the field, has suggested that the time when this will occur may not be too far away:

> It has been suggested by some that the problem of deep ocean mining is remote and that exploiters will be relatively few. The presumption here is the projected high cost for vehicles and equipment designed to operate on the ocean bottom. On the contrary, although they do not exist at present, it is contended that low cost vehicles capable of exploitation are technologically feasible and will be realized within the next two decades. . . . It has come as a surprise to the uninitiated, and even to some professional naval architects, that at present the major investment cost of deep submersibles is in the surface ships and surface support systems now required for their operation. That is presently the case because, except for static pressure, the greatest forces and most dangerous dynamics are at or near the surface and its attendant wave system.
>
> In summary, the projection of deep ocean technology is such that, in the period beyond 1980, we may expect a significant proliferation of nonmilitary submersible and low-cost equipment capable of operating throughout the water column at or on the bottom and capable of exploiting the sea bed or the resources of the sea bed.[11]

For the mining of manganese nodules and phosphorite nodules, however, man probably will not have to wait until such bottom operating vehicles are available. These resources could probably be commercially exploited now, utilizing simple drag or dredge techniques. Likewise, the industry has already demonstrated its capability for drilling oil wells in water over 200 meters deep. Thus, any regime for the ocean bed must take into account the reality of already initiated activities directed toward the exploitation of mineral resources.

For a drag or dredge type sea floor mining operation, the investment and preliminary development expenses for the entrepreneur would be extremely large.[12] For any operation involving extensive drilling or subsoil extraction, expenses would obviously be much greater.[13] Thus, the key element of a regime which would make possible the exploitation of the mineral resources of the subsoil and seabed would be an assurance to the developer that, once he has made a large investment, he will have some measure of exclusivity to protect him from "claim jumpers." As a leading authority, Dr. Athelstan Spilhaus of the University of Minnesota, has stated:

> If we are going to exploit the sea by private industry, we must work out laws that can give some kind of a patent or grant so that those who risk capital in its exploitation can be assured a reasonable reward.[14]

There are various possibilities, still to be explored, how this exclusive right to exploitation could be acquired; this, however, would appear to be a matter of secondary importance to the exploiting entrepreneur. His primary interest would be in obtaining sufficient assurance that, under the usual business risk principles, he would have an opportunity for sufficient profit to compensate him for the financial risks involved. The community interest in developing the resources of the seabed would, in turn, be served by providing this assurance.[15]

Living Resources. The claim is often made that the population explosion will soon exhaust the food resources of the land areas of the earth and that man will increasingly turn to the sea as a source of practically unlimited animal protein. But if this is to occur, man must markedly improve his harvest of the living resources of the sea. It has been estimated that in 1964 only 4 percent of the ocean's actual production of living resources of the kind that man was harvesting were actually harvested.[16] This small output results primarily from the fact that the methods used today for harvesting the sea are still basically those of the hunter of wild animals on land. Improved equipment and methods, together with much research, have resulted in marked improvements over the past few years and further improvements are promised.[17] However, many insist that the best way to utilize the sea is to adapt the ways of land agriculture to the sea. They visualize vast fish farms, fenced off by walls of bubbles in which fish are grown just as cattle are on modern land ranches.[18] Although such schemes may sound farfetched, similar processes are already in use in many areas of the world for cultivation of mollusks, clams, oysters, cultured pearls and, to a limited extent, fish.[19] A number of prominent scientists have given their support to them as being practical, at least in the shallower, well-aerated parts of the ocean.[20] The limitation to the shallow, well-aerated portions of the sea makes it likely that most of the sea floor activities connected with such fish farms would be confined to the continental shelves. Consequently, activities connected with the living resources of the sea should have little impact on a regime for the deep seabed.

Disposal of Wastes. Since time immemorial the sea has been used as a dumping ground for wastes. Because of the vastness of the oceans and the variety and abundance of sea life, the seas have been able to turn most of these wastes into valuable nutrients or at worst dilute them enough to be harmless.[21] With the coming of the nuclear age, however, a new problem has been introduced--radioactive wastes. The same qualities which made the ocean an attractive dumping ground for conventional waste products have made it attractive for disposal of radioactive wastes.[22] Although such radioactive wastes take a number of forms (e.g., coolant fluids from shore-based or ship nuclear power plants, liquid wastes from nuclear manufacturing plants or plants engaged in revitalization of fuel for nuclear plants,[23] the only kind which would be within the scope of the current paper would be solid wastes which would come to rest on the ocean floor. At the present time, the U.S. practice is to bury highly contaminated radioactive wastes on land. Only the slightly contaminated refuse created by day-to-day operations of nuclear reactors, such as gloves, clothes, and rags, is sealed in containers for depositing in deep recesses of the ocean.[24] Because of the increasing prominence of nuclear power and the ever greater quantities of radioactive residues that will be created in future years, however, this use of the deep ocean and its floor will probably increase.

Such use, however, does not have to be exclusive in the sense that only one nation or individual could use a particular area. It will be necessary, however, to insure that such wastes, once placed, not be disturbed until they are no longer a radioactive hazard.

Defense Activities. A detailed discussion of specific defense activities on the floor of the deep ocean is not possible in an unclassified paper. Nor is such a detailed, specific discussion necessary in order to determine the scope and nature of the U.S. national security interest in the ocean floor. Officials of the Department of Defense and Department of the Navy have spoken publicly about this interest and have sketched the key elements in unclassified form. Several of these statements are listed in the bibliography. Perhaps the most comprehensive and frank public discussion of the defense interests occurred in an address by Assistant Secretary of the Navy Robert A. Frosch on October 7, 1967.[25] He listed the following as the more significant defense interests:

> (1) Sea basing of strategic deterrent: Future design of sea based deterrents following POLARIS/POSEIDON may take many forms. Underwater silos, for example, are a possibility. Should that be so, it may be that the maritime nuclear powers would like to keep the continental shelves and deep ocean available for some use by such military systems. This, however, would not necessarily be a bar to use of these areas of the ocean bottom also for exploration and exploitation of natural resources.[26]
>
> (2) Warning and surveillance systems: The rules for military use of the sea should not forbid installations on the ocean bottom for the detection of submarines. . . . The rules should not deny freedom of the seas for deployment of strategic detection and warning devices.[27]
>
> (3) Other units deployed on the sea floor: The further extension of military capabilities to the seabed is a clear possibility. . . . The right to deploy units on the sea floor in international waters for the purpose of inspecting for mines or other impediments to the legitimate exercise of the freedom of the seas in particular seems useful.[28]
>
> (4) Protection of nationals engaged in sea floor activities: One other military possibility to be noted specifically is protection of those engaged in exploitation of the sea. United States capital is unlikely to be risked unless it is United States policy to protect the investments against foreign or piratical invasions. This will be a Navy and/or Coast Guard mission.[29]

Summarizing, Dr. Frosch stated:

> From the standpoint of the United States military capabilities, it would appear to be generally advantageous if claims of the seabed were limited to exploration and exploitation. The right of military surveillance could be endangered by permitting establishment of sovereignty or control jurisdiction, either by nations or international bodies, over the sea bottom.
>
> It is militarily desirable to: (1) minimize any extension of territorial seas; (2) closely limit sovereignty over the continental shelves; and (3) maintain freedom of the air space above the high seas.[30]

Thus, the United States has a vital interest in preserving the right to utilize the seabed of the deep ocean for defense activities. Such defense activities would be favored by a regime of freedom--one in which each nation would be free to carry out legitimate defense activities on the sea bottom beyond the continental shelf but without any exclusive appropriation of the sea bottom or a portion thereof solely for the benefit of one nation.

Other Activities. Although some of the more ardent proponents of increased exploration and exploitation of the ocean visualize use of the seabed for such activities as vacation resorts, colonies for semipermanent residence of scientists, engineers, and other underwater workers in ocean industries (e.g., mining), and even as sites for large, domed permanent cities,[31] these uses

are so far in the future that consideration of a legal regime applicable to such activities would seem to be pure speculation at this time. Even as to activities within the realm of early realization many uncertainties exist, making it difficult to visualize specific legal problems that may be faced. Only experience with the management of activities in the near future can provide a foundation upon which the principles for management of later, more comprehensive activities may be built. Thus, those "far out" activities will be considered in the later discussion only to the extent that actions taken now might prejudice later logical development of a regime to embrace them.

Summary. The foregoing survey of activities that are most likely to take place on the seabed within the foreseeable future suggests that for exploration, research, and defense activities, the basic principle of a regime which would favor such activities would be one of freedom, i.e., a shared or "inclusive" right to carry them out without hindrance, but also without excluding others from the same right. The disposal of radioactive wastes would likewise call for this type of regime. On the other hand, the exploitation of the resources of the seabed and subsoil would seem to be better served by the principle of exclusivity, i.e., a right to appropriate the resources of a particular area, at least for a specified period of time, solely for the benefit of the exploiter and to the exclusion of others.

It is now possible to proceed to an examination of the types of regimes which have been suggested for the seabed and subsoil of the deep ocean to determine how they fit the criteria derived above.

IV--ALTERNATIVE REGIMES FOR THE SEABED

Possible Alternatives. Legal regimes which have already been suggested for the seabed beyond the limits of the continental shelf include confirming the jurisdiction of the coastal state to the midpoint of the ocean, and establishing ownership in the United Nations. Traditional principles of international law suggest two additional ones, in particular: (1) consideration of the seabed as *res nullius*, that is, the property of no one and thus subject to appropriation by states under traditional principles of international law, and (2) consideration of the seabed as *res communis*, that is, the property of the world community and therefore not subject to the establishment of a national jurisdiction over it (but, as is accepted for fish in the high seas, subject to harvesting by all). This Chapter is devoted to an analysis of these four possible regimes.

Res Nullius. In customary international law the term *res nullius* or *terra nullius* refers to territory which, although capable of being acquired, has not yet been acquired by any sovereign.[1] The high seas themselves have long been considered as being *res communis* and not capable of appropriation by any state.[2] This principle was confirmed by the High Seas Convention adopted at Geneva in 1958.[3] The fact that superjacent waters are not subject to appropriation, however, does not necessarily mean that the seabed has the same status.[4] In the 19th century even so great a champion of the freedom of the seas as England claimed ownership of the pearl fishing beds under the high seas off the coasts of Ceylon and Bahrein on the grounds of uninterrupted and undisputed proprietorship of successive rulers since time immemorial.[5] The Bey of Tunis, during the same period, claimed sponge beds under certain areas of the high seas.[6]

The Continental Shelf Convention provides ample evidence that the status of the seabed can be separated juridically from the status of the superjacent waters. That Convention clearly spells

out that the status of the waters above the Continental Shelf as high seas is not affected by the coastal state's jurisdiction over the seabed and subsoil.[7] Thus, there would appear to be no legal incongruity in separate legal statuses for the seabed and superjacent waters.

If we assume that the seabed beyond the continental shelf could be considered as *res nullius*, it is necessary to determine what would be the means by which a nation would acquire jurisdiction, and what would be the advantages to the United States and to the world community if this status were established.

The method traditionally recognized as vesting sovereignty[8] to territory which is *res nullius* is occupation. Acquisition of sovereignty by occupation requires, first, intentional appropriation of territory not already under the sovereignty of any other state;[9] and second, "effective occupation."

In modern international law, "effective occupation" is a term not necessarily denoting physical settlement but rather meaning the actual, continuous and peaceful exercise of the functions of a state in relation to the territory. Professor C.H.M. Waldock, in a definitive examination of the most recent World Court cases on the subject, has concluded that the two essential elements are (1) the intention and will to act as sovereign and (2) some actual exercise or display of sovereignty. The second of these elements, in turn, consists of four elements which additionally go to prove the first. These are that the exercise of sovereignty must be:

(1) Peaceful--i.e., not contested from the beginning by competing acts of sovereignty.

(2) Actual--i.e., not a mere pretense. It must include acts which are either a genuine exercise of domestic jurisdiction or an international dealing, as by treaty.

(3) Sufficient to confer a valid title to sovereignty--i.e., sufficient under the circumstances of the particular territory. In sparsely inhabited or uninhabitable territory, the occupying state may not be required to maintain even a single official permanently on the spot.

(4) Continuous--this, like the degree of sufficiency, depends on the circumstances.[10]

Several noted international lawyers, during the formative period of the continental shelf doctrine, gave consideration to the theory of occupation as a means for the establishment of national claims to the seabed. Professor Waldock was one of those who favored the doctrine as a possible basis for such claims. He argued that the recent international court cases had negated the requirement that actual settlement or exploitation is a *sine qua non* of effective occupation. In his view:

> Occupation, in the modern law is the assumption of sovereignty rather than the appropriation of property and these three cases [*Island of Palmas, Eastern Greenland*, and *Clipperton Island*] lay down clearly that what is required is effective display of state activity in such a manner as the circumstances of the territory demand. No doubt, an international tribunal will still seek to distinguish between a genuine, effective manifestation of state functions and a purely paper claim but in desolate, or, in the case of the sea-bed, 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 sea-bed can probably be established without necessarily showing much or even any physical activity on the sea-bed itself.[11]

But Waldock hastened to add that proximity or contiguity is also an important factor in establishing the validity of such claims.[12]

Judge Lauterpacht argued for a more stringent test:

> To speak of occupation of submarine

areas is to use language even more unreal than that referring to occupation, as a basis of territorial title, of arctic and antarctic regions. States have indeed put forward claims--not altogether uncontroverted--to the latter, but they have not based them on any principle germane to occupation, effective or fictitious.

... As no effective acts of occupation (in the ordinary sense of the word), concurrently with the act of proclamation of title or at any ascertainable period in the foreseeable future, are possible in relation to contiguous submarine areas, it is found necessary to fall back upon the barest minimum of occupation which reduces occupation to a shadow of its natural meaning, namely, to a proclamation and, possibly, the granting of concessions.[13]

Judge Lauterpacht went on to say that "effectiveness" supported by contiguity was the test. He then stated:

But effectiveness is not a magic formula which can be applied with mathematical precision. It is effectiveness relative to the situation and the circumstances. It may range from the requirement of intensive administration in every 'nook and corner' in a densely populated and developed area to mere 'state activity' manifesting itself in the conclusion of treaties and conferment of concessions by an authority situated in a narrowly circumscribed part of the territory or even outside it; and it may assume the form of a mere proclamation. ... As already suggested the conceptions of effective occupation and contiguity, being relative, are but a starting point. It is within the legitimate province of the judicial function--and of statesmanship--to use them with such discretion as the equities of the case and considerations of stability require.[14]

Professor Richard Young, on the other hand, rejected the doctrine of occupation entirely, stating that it:

... reintroduces into international law the idea of fictitious occupation as a valid basis of title. That concept, found by experience to be a fertile breeder of controversy, has been largely rejected in modern times, save perhaps for the polar areas. The wisdom of readmitting it with respect to submarine areas is at least questionable. To insist that occupation is necessary under a general rule, and then to admit a spurious occupation as sufficient, is devious reasoning. The necessity of a fiction strongly suggests that the problem is in the wrong pigeonhole, and that claims to submarine areas require different treatment from claims to land territory.[15]

As will be recalled, the continental shelf *has* been placed in a different "pigeonhole"--one based on the depth of the superjacent water and adjacency to the claiming state. For submarine areas beyond the continental shelf, however, there is no convenient "pigeonhole" readily available for disposal of the vast areas of the seabed. Occupation, despite its fictitious character, has certain elements to commend it for consideration. The foremost of these is that despite uncertainties and ambiguities in the doctrine, it does prescribe certain minimal criteria which appear to be generally accepted. The idea of effective occupation of the area claimed would certainly serve as a damper on broad, exclusive national claims. Even in the inhospitable environment of the deep seabed, some activities greater than mere proclamations would be required to meet the test. Thus, perhaps the broad, sweeping unilateral claims which marked the history of national territorial sea claims could be avoided.

On the other hand, as Young has pointed out, the doctrine has been "a fertile breeder of controversy."[16] Tying an ambiguous concept to an area of the earth which is largely unexplored and unexploited, and apparently for some time yet unexploitable in a meaningful sense, would certainly breed additional controversy. Not only is it uncertain as to what types of activities would be sufficient to constitute effective occupation, but also the physical characteristics of the sea do not suggest any readily identifiable means of determining the boundaries of an area which

might be occupied.[17]

From the standpoint of the United States interests, application of the doctrine of occupation to the seabed would probably be a net advantage. Within the foreseeable future only a few of the more highly developed, technologically advanced nations would be in a position to make claims under this doctrine. Despite a relatively late start in the field, the United States is now well ahead in the undersea technology race. Dr. Edward Wenk, Executive Secretary of the National Council on Marine Resources and Engineering Development, recently stated that the United States has a 5 to 1 edge over all other nations combined in its ability to probe the untapped wealth of the oceans.[18] Furthermore, the technological inability of other states to assert valid claims to areas of the deep ocean bed would preserve to the United States (at least for a time) the right of inclusive use of the seabed for the continuation of its research and exploratory work, radioactive waste disposal, and defense activities in unclaimed areas.

The very properties which would appear to make adoption of the occupation theory of advantage to the United States (and by the same reasoning to other technologically advanced nations such as the United Kingdom, USSR, France, and Japan) would probably make it unacceptable to the less advanced states. Their lack of technological capability would permanently freeze them out of any access to the resources of the deep ocean, for presumably as their technology and financial resources would increase, so too would those of the advanced nations, thus leaving the backward states with only the "leftovers" for their occupation and claim. Fear of this--and the desire that future exploitation of the seabed should primarily benefit the developing nations--pervaded the statements of many of the smaller nations during the debate on the Malta resolution at the Twenty-second Session of the United Nations General Assembly.[19]

Thus, although adoption of a regime based on the *res nullius* doctrine would appear to have certain favorable features from the standpoint of the United States, its acceptability to the less developed states would appear to be highly questionable.

Res Communis. The high seas are open to all nations and no state may validly purport to subject any part of them to its sovereignty.[20] Article 2 of the High Seas Convention lists four specific freedoms which are included within the doctrine of freedom of the high seas, but, in prefacing the listing by the term *inter alia*, it indicates that the list does not exhaust the types of activities which nations are free to conduct on the high seas.[21] Included among the additional types of activities are naval exercises, including gunfire, torpedo, and bombing practices; weapons testing; waste disposal; and research and exploration.[22] All activities on the high seas are governed by the general prescription of Article 2 that:

> These freedoms, and others which are recognized by the general principles of international law, shall be exercised by all States with reasonable regard to the interests of other States in their exercise of the freedom of the high seas.

The device which has insured respect for the rights of others in an area not subject to the jurisdiction of any state is the doctrine of nationality of ships. This doctrine requires that a ship be registered in some state as a prerequisite to its right to sail on the high seas. The state of registry--the flag state--in turn is required to exercise its jurisdiction over the ship and crew to insure their compliance with the international law of the high seas.[23] On the high seas, the jurisdiction of the flag state is exclusive.[24]

The freedom of the high seas for the lawful use of all nations (but for

appropriation by none) has given rise to the use of the term *res omnium communis* or *res communis*, that is, belonging to all states equally, as being descriptive of the legal status of the high seas. Although the description is not precisely accurate, it will be used in the remainder of this paper as a shorthand means of referring to the principles of freedom applicable to the high seas. Neither the phrase *res communis* nor the doctrine of freedom means, however, that the resources of the sea cannot be appropriated by a state or its nationals. The right to take fish from the high seas provides the clearest, and most firmly established, example that the seas' resources can be appropriated. What the doctrine does mean is that no state can appropriate an area of the high seas for exploitation solely by its nationals. The distinction between a status of *res nullius* and *res communis* is that in the case of the former, certain acts may vest title to a particular territory or area in a sovereign; in the latter, title to resources vests upon their reduction to possession. Since fish and other resources of the high seas are currently harvested in this manner, obviously the same theory provides one possible regime for the seabed beyond the continental shelf.

The theory behind such a regime would be that the seabed and subsoil of the deep oceans, and the resources thereof, are a "free good," like the air we breathe or the fish of the high seas. The basis for such a theory is the inexhaustibility of the resource. If the resources are indeed inexhaustible, then there is no need for exclusive rights. McDougal and Burke have stated the case for such a theory thus:

> This inclusive access to, and enjoyment of, the oceans has encouraged the different communities and peoples to bring their particular talents and resources to bear upon the production and sharing of the benefits from the oceans and has, thus, greatly enhanced the aggregate base values available to, and employed by, the general community for such purposes. . . . the vastness and the immense riches of the oceans have . . . facilitated the development in high degree of joint, noncompetitive and cooperative, strategies, characterized by a minimum of mutual interference and deprivation. The outcomes of this inclusive, cooperative enjoyment of the oceans, as demonstrated in recent centuries, have been genuinely integrative--with all peoples gaining and none losing--in an enormous production of goods and services for all mankind.[25]

Not everyone is as sanguine as McDougal and Burke as to the results of uncontrolled, shared use of the seas. The long list of depleted stocks of fish provides ample evidence that at least the living resources of the sea are not inexhaustible.[26] Examples from nonsea areas would also suggest that the unregulated use of resources leads to waste and in some cases exhaustion. For example, until the first quarter of the present century, western grazing lands were treated as common property resources, a treatment that was initially established because it was believed they were inexhaustible.[27] Similarly, unregulated exploitation of petroleum resources in the early stages of large-scale use of that resource resulted in highly wasteful practices.[28] And every American schoolchild learns of the extinction of the passenger pigeon and near extermination of the buffalo by uncontrolled hunting.

But even assuming inexhaustibility of resources, there is another problem with respect to a regime of freedom of exploitation of the seabed. The key element of a regime which would favor exploitation of the resources would be assurance that the entrepreneur would have sufficient exclusivity so that he would have a reasonable opportunity to recover the costs of his investment and make a profit. If the mineral resources are really so vast as to make room for all, their commercial value varies with the composition and concentration of nodules, their depth, and the proximity

to operating bases and markets.[29] Thus, there would be competition to harvest or exploit those of the greatest economic value. The concentration of the fishing fleets of many nations in the areas of richest catches, such as the Grand Banks of Newfoundland and the waters around Iceland, provides an example of the natural consequences of such a regime.

While the process of accommodation could work for fisheries, there is probably less chance that it would for exploitation of seabed resources. The economics of the two situations are quite different. Calculations based on Mero's studies of manganese nodule deposits have indicated that an entrepreneur would probably require exclusive rights to an area of at least 1,000 square miles to make exploitation of manganese nodules economically feasible.[30] Mining or drilling into the subsoil would be even more expensive, with an even greater requirement for exclusivity to make the venture potentially profitable.

The foregoing discussion of the *res communis* theory has concentrated on the resource exploitation aspect of the problem because that would be the activity most affected by adoption of such a regime for the seabed and subsoil. If this theory were adopted, other activities on the seabed could be carried out in the same manner as they are carried out on the high seas today. Each nation and its nationals would be free to conduct lawful activities, subject only to the laws of the "flag state" and to the rights of others likewise engaged in lawful projects.[31] These activities--research and exploration, fishing, waste disposal, defense activities, etc.--are inclusive rather than exclusive in nature. They are, additionally, the types of activities that states have traditionally carried out on the high seas without the necessity of a national or international jurisdiction over the area in which they are conducted. Controversies and competing uses have been worked out through an accommodative process which, although far from perfect, has generally kept the high seas free for the lawful use of all. Thus, activities other than resource exploitation would appear to be favored by a *res communis* regime for the seabed.

If, however, the exploitation of the seabed's resources should become the dominant activity, interaction between such exploitation and the other activities might have adverse effects on the latter. For example, drags, dredges, drill rigs, and the like might have an adverse effect on the use of the same area of the seabed for defense activities or research activities, or might require restrictions on the use of the high seas themselves to protect the sea bottom activity. Whether mutual accommodation could occur in such circumstances is conjectural. Obviously, in the absence of some authority over the area--either national or international--failure of accommodation is a distinct possibility.

A *res communis* regime would appear to be advantageous to the United States from several standpoints. Probably the foremost is that activities conducted by other states, no matter how extensive or long continued, would not lead to the establishment of claims to jurisdiction by such states. Thus, the right of the United States to continued use of the seabed for a wide range of current activities would be protected. Additionally, as the leader in underwater technology, the United States has a valid interest in preserving the availability of the maximum area of sea bottom for future exploitation by its nationals. A regime which would prevent the assertion of national claims would obviously serve this end. Once commercial exploitation of the mineral resources of the sea bottom begins, however, a regime which would not protect the first entrepreneur in an area against "claim jumpers" would create little incentive for imaginative and risky ventures.

From an international viewpoint, a

regime based on the *res communis* theory would probably have little attraction, particularly to the less-developed nations of the world. Just as in the *res nullius* concept all of the benefits derived from exploitation of the seabed would flow to the technologically advanced states. The less-developed states would receive little or no benefit from it. Thus, this theory would probably be unacceptable to such states.

Coastal State Jurisdiction. Under the present state of the law, the sea's bottom beyond the limit of the continental shelf is not subject to the claim of any state. However, a scheme which would vest jurisdiction in the coastal state is one of the possible regimes which merits consideration in any examination of alternative regimes.

Coastal state jurisdiction has considerable appeal. The exploitability criterion of the Continental Shelf Convention provides its natural basis. If it is assumed that the exploitability criterion could be extended outward beyond the limit of the continental shelf, it would follow, by analogy to Article 1 of the Continental Shelf Convention,[32] that as any coastal state acquired the capability to exploit to a greater depth, all coastal claims would be extended outward to equal depth.[33] Assuming the eventual capability of exploitation of even the deepest ocean floor, the final result would be that the entire ocean bed would belong to the coastal states of the world.

Under the foregoing theory, the claims of opposite coastal states would eventually meet, which raises the question where the boundary between them would lie. Article 6 of the Continental Shelf Convention provides the answer:

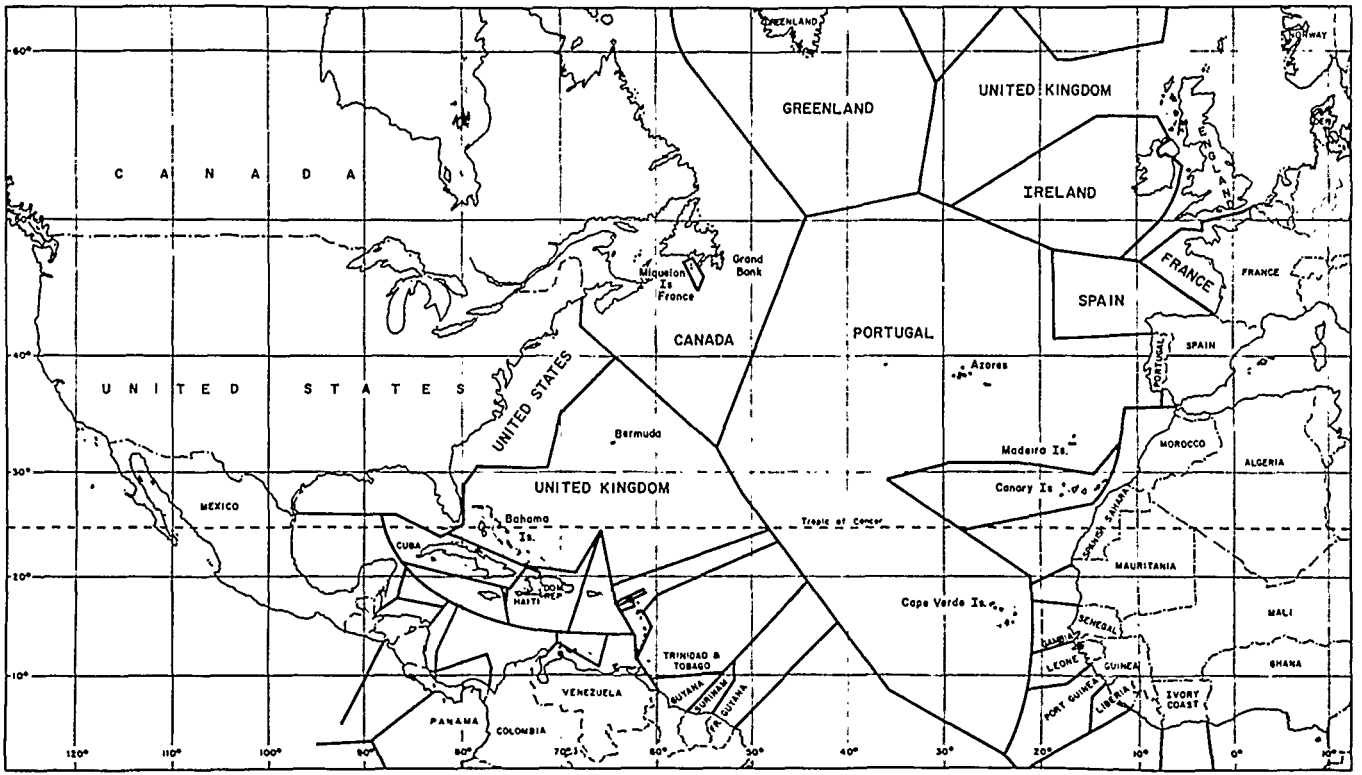
> 1. Where the same continental shelf is adjacent to the territories of two or more States whose coasts are opposite each other, the boundary of the continental shelf appertaining to such States shall be determined by agreement between them. In the absence of agreement, and unless another boundary is justified by special circumstances, the boundary is the median line, every point of which is equidistant from the nearest points of the baselines from which the breadth of the territorial sea of each State is measured.

Paragraph 2 of the same Article prescribes an identical formula for establishing the boundary between adjacent states.

The principal advantage of such a regime would be its simplicity. Although there might be some problems in determining exactly what is meant by exploitability,[34] the delineation and administration of national claims under this theory would be relatively simple compared to the other regimes examined. Demarcation of outer boundaries would follow the isobath and could easily be drawn on hydrographic charts. If technology does eventually permit exploitation to the deepest parts, the equidistance principle provides a workable mechanical method of drawing boundaries in the absence of an agreement.

An appreciation of the result of a coastal state regime with boundaries delineated in accordance with the foregoing principles can be gained by examining Figure 2, which is a chart of a portion of the North Atlantic Ocean showing national seabed boundaries extended to their maximum limits and drawn in accordance with the equidistance principle. What immediately strikes the observer is the predominant role played by islands. Under the Continental Shelf Convention, islands have the same basis for claims to the seabed and subsoil as do continental mainlands. Although not shown in Figure 2, even such insignificant dots as Clipperton Island, Ascension Island, St. Helena Island, Tristan de Cunha and South Georgia would serve as bases for large national claims. The United States would be able to claim vast areas of the Pacific because of the location of the

Figure 2.--North Atlantic Ocean with Seabed Boundaries Based on Equidistance Principle



Hawaiian Islands. In the Atlantic, however, foreign offshore islands would be a barrier to very extensive claims.

A regime which divided up the seabeds according to this system would probably be conducive to maximum exploration and exploitation of the natural resources of the seabed. Each coastal state could grant the exclusive rights which have been found to be a necessary precondition to commercial ventures for mining of the seabed. If the coastal state did not care to exploit the seabed itself--or did not have the technological capability--it could license foreign companies and extract a royalty income. The promise of a monetary return to the licensing state would probably serve as the necessary spur to encourage rapid development of undersea resources.

Other types of activities on the seabed, however, might be severely hampered. As Dr. Wilbert Chapman has pointed out, assertions of special purpose jurisdictions by coastal states over areas of the high seas tend to ripen into general jurisdictions.[35] The history of the continental shelf claims by other states following the Truman Proclamation in 1945 illustrates this phenomenon. Although the Truman Proclamation asserted only a special purpose jurisdiction for the purpose of exploiting the natural resources of the shelf, the claims asserted by a number of other states were not so narrowly defined. In some cases they were all inclusive, asserting full sovereignty over the seabed, the superjacent waters, and the airspace above them.[36] Thus, a major drawback of a coastal state regime over the deep ocean floor would be the possible creation of a conglomeration of "national lakes" in which the traditional freedom of the high seas would have shrunk to only a shadow of its former self.

A second drawback would be the probable opposition of the U.S.S.R. The coastal state approach would provide practically no gains to the U.S.S.R. other than a small portion of the Northwest Pacific and the Barents and Arctic Oceans. It seems unreasonable to expect that the Soviet Union would agree to a regime in which it gained so little and others gained so much. Without the agreement of the Soviet Union, it does not seem possible that a viable regime would result.

Finally, because the results of the coastal state regime are so uneven in the distribution of benefits, it appears unlikely that it could receive anything approaching a consensus in the world community. Inland states, of course, would receive no benefits. States with only short coastlines, or whose coastlines are of a concave configuration, would generally receive little. Islands would be the big gainers, and in many cases they are not at all well situated, politically, economically, or technologically, to do the best job of exploiting the undersea resources.

In sum, therefore, although coastal state jurisdiction has a considerable superficial attraction, it has a number of drawbacks which make its adoption as a regime for the deep ocean bed less than ideal.

International Jurisdiction. Suggestions for the establishment of an international regime for the deep ocean bed have come from a number of sources--private individuals,[37] study groups and commissions,[38] government officials,[39] and governments themselves.[40] Such suggestions have varied in their details but have generally included the following core elements:

(1) Vesting of jurisdiction over the seabed and subsoil beyond the edge of the continental shelf in the United Nations or in a special international agency;

(2) Establishment of the principle that the seabed and subsoil beyond the continental shelf are not subject to appropriation by any state;

(3) Leasing or licensing of private exploitation of the resources of the seabed and subsoil by the international agency; and

(4) In several proposals, reservation of the seabed solely for peaceful purposes.

The discussion of methods for bringing such arrangements into being is reserved for Chapter V. The discussion in this section considers the advantages and disadvantages that might be anticipated from such a regime.

The Commission to Study the Organization of Peace, the research affiliate of the United Nations Association of the United States, which is one of the proponents of an international jurisdiction for the ocean's floor, lists six principal advantages which it says will flow from such a regime. They are:

(1) It would avoid controversy among nations arising from conflicting claims to, and appropriative uses of, the uncommitted areas of the earth;

(2) It would insure the economically most effective use of the natural resources of the sea;

(3) It would prevent military use of the seabed;

(4) It would avoid contamination of the seas;

(5) It would insure that all nations would profit by the opportunities and potential resources; and

(6) It would provide the United Nations with an independent source of income (from licensing and registration fees).[41]

The foregoing list of advantages seems to include all of the important ones claimed by the other proponents of an international regime. The emphasis given to one or another has varied considerably, however. The proposal of Malta at the 22nd session of the General Assembly put primary emphasis on the necessity of preventing the utilization of the seabed for military purposes and on the benefit which the United Nations would derive from the income received, which, in turn, could be used for the benefit of the developing nations.[42] Senator Pell gives primacy to the need to provide for order to foster rapid technological breakthrough which he believes is imminent.[43] Quincy Wright assigns equal weight to the promotion of world peace, efficient exploitation, and equitable opportunity among nations.[44]

The resolution of the Government of Malta at the 22nd General Assembly provoked a flurry of interest in the U.S. Congress in the fall of 1967. Fifteen resolutions were introduced in the House of Representatives in opposition to vesting title to the ocean floor in the United Nations.[45] In the Senate three resolutions were introduced, one opposing an international regime and two favoring it.[46] Committees in both Houses have held hearings on the subject, at which the proponents and opponents were heard. The primary objection of the opponents was not substantive but procedural. Both governmental and nongovernmental witnesses asserted that knowledge about the ocean depths was at present too primitive and incomplete to permit advocacy of any substantive regime for the deep ocean bed. The spokesman for the Department of State, for example, stated:

> All of us in a sense are groping in an area in which not much has been done. We are certainly unclear as to the possibilities economically. We surely don't know as yet precisely what the security implications are. There is so much work to be done that it would clearly be a mistake to proceed to develop conclusions at this time.[47]

The Assistant Secretary of Interior stated the position of his Department thus:

> The Department recognizes that the United Nations is a suitable forum for

> development of international law for use of the oceans' resources. We believe that in the present state of our knowledge of the resource of the deep-sea bed and the problems that may be involved it is premature to consider international control over these resources, and for that reason we do not support the treaty as proposed by Malta.[48]

The Assistant Secretary of the Navy, representing the Department of Defense, stated:

> . . . it is much too early in our knowledge and understanding of the nature of deep ocean resources and of the technology that will be required to exploit them for us to consider major legal questions regarding its exploitation and ownership, certainly too early for us to think that we would know what we were doing if we were to take action to vest control of ocean resources in an international body in a specific way.[49]

The representatives of the Executive Branch of the Government, who raised objections on the basis of prematurity, refused to suggest any alternative regimes which the Government might support. Some of the Congressional and private witnesses, however, in addition to echoing the doubts expressed by administration witnesses, did point out what they believed were substantive objections to an international regime.

(1) Internationalization of the deep ocean bed would amount to a giveaway of United States resources;[50]

(2) Nations are capable of working out shared use arrangements and resolving any disagreements by mutual accommodation without the necessity of an international body assuming jurisdiction;[51] and

(3) An international administering agency with its attendant bureaucracy would retard technological progress in exploration and exploitation of the seabed.[52]

In examining the various claimed advantages and objections to an international regime, it is important to recognize, first, that the objection of prematurity, which is the one most frequently raised, is not an objection to an international regime *per se*. Rather, it is an expression of a governmental position that it is too early for the United States to take a firm position on any regime for the deep seabed. The reason it appeared to be an objection to internationalization was that it was the Malta proposal for an international regime which occasioned the debate on the subject. Thus, insofar as this is an objection to internationalization, it is also an objection to any of the alternative regimes which have been discussed.

With respect to the advantages claimed for an international jurisdiction, it is important to recognize that some of them presuppose the acceptance by the world community of the principles advocated. For example, the claim that an international regime would prevent military use of the seabed assumes agreement on making the seabed a weapon-free area. Yet, in the U.N. debates on the Malta resolution, the United States and U.S.S.R. indicated coolness to this aspect of the proposition, seemingly expressing a preference for treating this aspect within the overall framework of disarmament rather than in connection with a discussion of the oceans.[53] It is obvious that any regime which did not obtain the concurrence of these two superpowers would be meaningless.

Apart from this caveat, it should be pointed out that an international regime does offer genuine advantages. An international licensing and rulemaking body could promote the orderly exploration and exploitation of the ocean floor. The objection that an international agency would be an obstacle to such exploration and exploitation is conjectural. The history of international administration in such fields as civil aviation, telecommunications, postal affairs, and other functional matters within the

competence of the Economic and Social Council of the United Nations and the specialized agencies is one of generally harmonious and fruitful progress. In the case of exploitation of seabed resources, there would be the added incentive that the U.N. agency would be deriving an independent income from its grants of exploitative rights--an arrangement which would be conducive to establishing simple and expeditious procedures for granting such rights.

The idea that an international regime would insure that all nations draw benefits may be overoptimistic. Although an independent income for the United Nations would be of indirect value to all nations, those that would profit most, by being involved in the actual exploitative operations, would probably be the same nations that would be involved in such operations under any possible regime, i.e., those with the technological and financial resources to embark on the expensive programs involved. Even for them, the day when any large-scale profits are derived may still be some distance into the future.

As far as U.S. interests are concerned, the allegations that the adoption of an international regime would be a "giveaway" appear to be overstated. Since at the present time no nation has a valid claim to the seabed beyond the continental shelf, the United States, in agreeing to international jurisdiction over the seabed, would not be giving away any of its rights. Furthermore, as the most advanced nation in undersea technology, the United States and its citizens would find a leading role in the exploitation of the deep ocean under any of the alternative regimes. Assuming that any jurisdiction vested in an international body would be no more extensive than that currently exercised by coastal states over the continental shelf --i.e., sovereign rights to explore and exploit the natural resources--activities not interfering with exploitative activities would not be hampered and could be carried on by any nation with essentially the same freedom as exists today.

As a final comment on this regime, it appears that, despite the apparent unwillingness of subordinate U.S. officials to commit themselves in any specific way except that much more work must be done before the United States can take a position, a 1966 statement by the President indicates a marked leaning in the direction of an international regime. In an address at the commissioning of the oceanographic research ship *Oceanographer* on 13 July 1966, he stated:

> ... 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 the ocean bottoms are, and remain, the legacy of all human beings.[54]

In his statement before the First Committee of the General Assembly on November 8, 1967, Ambassador Goldberg quoted the President's statement and then added:

> This means, in our view, that the deep ocean floor should not be a stage for competing claims of national sovereignty. Whatever legal regime for the use of the deep ocean floor may eventually be agreed upon, it should ensure that the deep ocean will be open to exploration and use by all states, without discrimination.[55]

Thus, although only a bare framework has been traced out, the United States appears to have committed itself to the principle of ruling out purely national claims to portions of the seabed.

Summary. The four bases for a regime of the ocean bottom which have been examined do not exhaust all of the possible bases for such a regime. An entirely novel approach might be adopted--or perhaps a composite regime incorporating features of one or more of

the several jurisdictional models discussed. For example, there might be a possibility of a regime which would recognize national claims to the seabed but establish an international agency or mechanism for recording of claims and settlement of disputes. The four regimes, however, embrace the best defined models within the range of possible jurisdictional arrangements. The *res nullius* and coastal state approaches would lead to national jurisdiction over segments of the seabed; the international approach would lead to an international body having jurisdiction of sorts; the *res communis* approach would not vest jurisdiction over the seabed *per se* but would lead to control of seabed activities by the "flag state" of the vessel or structure. By focusing on the four approaches it has been possible to examine the full range of jurisdictional problems in relation to the various activities foreseen for the ocean floor. As has been seen, each model has certain advantages and is accompanied by certain drawbacks. Table I summarizes the results of that examination.

Table 1.--Summary of Jurisdictional Model Examination

		Jurisdictional Models			
	Contexts	Res Nullius	Res Communis	Coastal State Juris.	Internat. Juris.
(A)	Type of activity				
	Exploitation of natural resources	+	-	+	+
	Exploration and research	+	+	-	+
	Defense activities	+	+	-	?[a]
	Disposal of wastes	+	+	+	?[a]
(B)	Other Important aspects				
	Advantage to United States	+	+	-	?[a]
	Advantage to U.S.S.R.	?	+	-	?[a]
	Acceptability to developing nations	-	-	±[b]	+
	Enhancement of orderly relations between states	-	-	-	+

Key: + = favorable
- = unfavorable
?= unknown or conjectural

[a]Whether favorable or unfavorable would depend on nature of the international regime.

[b]Probably acceptable to those with extensive coastlines and to island states; probably unacceptable to others.

V--ALTERNATIVE PROCEDURES FOR ESTABLISHING A LEGAL REGIME

Having examined the alternative regimes that might be applied to the seabed and subsoil of the deep ocean beyond the limits of the continental shelf, it is appropriate to examine the procedural means by which a regime might be brought into being. It will be the purpose of this chaper to consider several of these procedures, primarily from the viewpoint of actions open to the United States.

The procedure which has received the most public notice in recent months is the negotiation of an international multilateral treaty for the ocean floor under the auspices of the United Nations. This was the approach suggested by the Government of Malta in its proposal in the 22nd General Assembly of the United Nations. A second approach might be based on a unilateral proclamation by the United States asserting a claim to certain rights, in a manner similar to the Truman Proclamation on the continental shelf, or proclaiming U.S. adherence to some other principle. A third approach could be dubbed the "wait and see" method.[1]

Negotiation of an International Treaty. Most of the suggestions for negotiation of a multilateral treaty to establish a seabed regime have been coupled with the proposal that the treaty should also establish the jurisdiction of an international body over the seabed and subsoil. The policy of seeking a treaty, however, need not necessarily lead to a particular type of regime. The Continental Shelf Convention, which created *national* jurisdiction over portions of the seabed, resulted from an international conference. The High Seas Convention, which confirmed the principle of freedom of the high seas for the use of all nations, resulted from the same international conference. As will be seen below, however, the means adopted for creating a legal regime may have *some* influence on the nature of the regime which results.

The precedents most frequently cited for an ocean bed treaty are the treaties governing Antarctica[2] and outer space,[3] particularly the latter. Those who urge early negotiations for a treaty on the ocean bed see an analogy between the situations which confronted the world's decision makers in dealing with the issue of competing claims and uses of outer space and Antarctica and what has sometimes been called "inner space."[4] They point out that by sitting down together around a conference table, the nations of the world were able to remove these vexing problems from the arena of international competition and create a basis for peaceful cooperation among nations. Whether these two treaties did, in fact, accomplish as much as has been claimed for them is somewhat open to question.[5] Nevertheless, assuming *arguendo*, that the two treaties did settle troublesome problems, the situational similarities between the seabed and these other two environments are not necessarily so great as to suggest that the same procedure would be equally applicable to it. Perhaps the most significant distinction is the difference in the world community's perception as to the value of the spaces involved. In the cases of Antarctica and outer space, only the prospect of gaining scientific knowledge was involved; not of that productive use or economic gain from their exploitation.[6] On the other hand, there is a general belief among those who advocate negotiation of an ocean floor treaty now that there are vast riches on the deep ocean floor merely waiting for the enterprising businessman.[7] Although this belief is probably greatly overoptimistic (at least for the near term), it pervades the discussion of the subject and provides one of the significant impulses for the drive toward negotiation.

A second important distinction is the

differing knowledge of the environments involved. In comparison to more hospitable land areas of the world, man's knowledge of the Antarctic is limited. Yet many nations have carried out extensive exploration and research there for several decades,[8] apparently of sufficient scope and depth to assure the nations principally concerned that they would not subject their interests to very severe risks by putting the issue to an international negotiation.[9] With respect to outer space, despite the fact that man's explorations really began only about a decade ago, the intensity of the effort during that decade has likewise created a vast amount of knowledge. In addition, during this short period, a considerable body of international precedent had already been built up reflecting the degree of mutual tolerance of inclusive uses of space which the principal powers would accept. U.S. Ambassador to the United Nations Arthur Goldberg has stated that the U.N. sponsored treaty on outer space evolved from a perception of common interests "...on the basis of experience... [which gradually crystallized into binding rules of law."[10] But he also suggested that "... *both countries resisted the injection of questions which*, though important and logically related to the agreed principles, *were not ripe for international negotiation*--such as the delimitation of outer space and the exploitation of resources on celestial bodies."[11]

In agreement with the testimony of U.S. officials in Congressional hearings discussed in Chapter IV, the status of the deep seabed may be more analogous to those issues referred to by Ambassador Goldberg as "not ripe for international negotiation" than to those which were covered in the Outer Space Treaty. In a more general vein, Ambassador Arthur H. Dean, speaking from his experience as the chief U.S. delegate at a number of important international conferences, including the 1958 and 1960 U.N. Law of the Sea Conferences and several years as the chief U.S. disarmament negotiator, has stated:

> There is an understandable reluctance on the part of national governments to enter into agreements with other countries binding them irrevocably to future action or inaction. Circumstances, science, and technology change, and nations should not always assume obligations into the indefinite future for better or for worse. As a general rule, therefore, most nations prefer to work out *ad hoc* arrangements with other countries rather than to enter into formal agreements which may prove unduly restrictive in the light of later knowledge.
>
> This natural inclination to avoid any rigid treaty is especially pronounced when the dimensions of the subject matter of a potential treaty are relatively unknown and, accordingly, where the eventual effect of agreement can least be gauged. When the activity sought to be regulated by treaty has just commenced, so that customs and practices with respect to it have not crystallized, treaties--which draw much of their text and support from customs and practice--will seldom be found.[12]

All that Ambassadors Goldberg and Dean have said applies in full measure to the current state of knowledge of the deep seabed. Nevertheless, the pressure for some sort of U.N. action was apparently so great at the 22nd General Assembly that the major powers had to go at least part way toward meeting this demand by agreeing to a resolution calling for the formation of a 35 nation *ad hoc* committee to study the scope and various aspects of the Malta proposal; to undertake a survey of past activities of the United Nations and other international agencies in the field and to prepare an account on all aspects of the question. The Resolution also called on the *ad hoc* committee to study means for promotion of international cooperation and submit a report to the 23rd session of the General Assembly.[13]

The Resolution passed by the 22nd General Assembly has the familiar ring

of the early history of U.N. action which ultimately led to the adoption of the Outer Space Treaty of 1966. Initial action within the United Nations on that subject was the establishment in 1958 of an *ad hoc* committee to study the peaceful use of outer space. A year later an enlarged Committee on the Peaceful Uses of Outer Space was created. This Committee worked through the early sixties with few concrete results.[14] By 1966, however, experience had demonstrated that there was an area of common interest between the U.S.S.R. and the U.S. which could form the basis for an outer space treaty.[15] Thus, in 1966--year 9 of the space age--upon the initiative of the United States and the U.S.S.R., a treaty was rapidly negotiated under the auspices of the Committee, resulting in the laying of a draft text before the General Assembly in December of that year.[16] The Treaty was signed by 60 nations at a White House ceremony on 27 January 1967.[17]

Although the United Nations has taken only the first tentative step in the same direction with respect to the sea floor, it is not inconceivable to visualize a similar outcome a few years hence.

Unilateral Declaration. The outcomes of particular international issues are frequently powerfully influenced by the initial positions asserted by or on behalf of a single prominent state. Grotius' freedom of the seas doctrine, which was in reality a plea for freedom of navigation and fishing for Dutch vessels against the claims of more powerful European nations to exclusive jurisdiction over vast areas of the sea, had a marked influence on the development of the law of the sea.[18] In more recent times, the rapid development of the continental shelf doctrine was, as has been seen, the direct result of President Truman's 1945 Proclamation.

Several factors can affect the influence which a single national statement of position can have. Professor William T. Burke has pointed out that the timing of a state's initial claim is often as important as its substantive content in determining the influence it will have. He suggests that one reason the Truman Proclamation had as much influence as it did was that it was made at a time when the world community was at the threshold of activities on the Continental Shelf. At that time, practices and claims inconsistent with the asserted U.S. position had not yet had a chance to develop. Burke suggests that we are today in essentially the same threshold position with respect to the resources of the sea floor and that an assertion of national position by the United States would have considerable influence over the future development of the law. The fact that the U.S. technological lead will probably result in U.S. nationals being the first to exploit the surficial deposits of the seabed will, in his view, enhance the influence which the United States could exercise by a unilateral assertion of position.[19]

The substantive position taken by a state obviously has an effect on the influence which the unilateral assertion of position will have. Professor Burke points out that claims to exclusive uses have gained more general assent than have those in which restraint was exercised.[20] Experience over the past 2 decades with respect to territorial sea claims provides evidence of the trend toward broader, exclusive claims. Not only have many of the older states extended their territorial sea claims to 12 miles or beyond, but most claims of the newly emerging states have been for 12 miles or beyond.[21] The Geographer of the State Department, G. Etzel Pearcy, has suggested that the basic impetus for this trend is nationalism:

> Growing nationalism in a world fraught with tensions also causes many nations to look seaward, whether apprehensive as to securing their domain or to extending it. In fact, strong

> nationalism by its very nature serves as the incipient forerunner to offshore claims--always increasing, never decreasing. Not uncommonly a state will make greater offshore claims in response to similar claims on the part of a neighboring state.
>
> The emergence of 54 newly independent states since December 1945, each with a fresh consciousness as to its national domain, has accentuated attention given to sovereign territory and its bounds.[22]

Even where the claim is not for an exclusive use, the advantage of having, in effect, preempted the field gives the initial claimant an inherent advantage. On this point, Professor Burke states:

> To be sure, past experience has been that restraint in assertion of claim has not prevented others from making extravagant demands. Nonetheless, it merits emphasis that these demands, though still not wholly effectively refuted, have never commanded wide assent and, indeed, have been categorically rejected by most states. At the very least, it seems evident that the United States could, by suitably limited claim or announced position, promote policies directed at maximizing inclusive benefit from the vast storehouses of resources in and under the sea.[23]

It would appear from the foregoing that if a unilateral proclamation by the United States were to have decisive influence, it would be important that it be made prior to the time that activities on the seabed reached such a stage that other states felt that their national interests required them to assert inconsistent national claims. It would appear to be particularly important that prompt action be taken by the United States in the event that the position eventually opted for is some sort of inclusive regime allowing access by all states to the seabed rather than an exclusive national claim. As Pearcy has aptly put it, offshore claims, once asserted, are "always increasing, never decreasing." It seems evident that had the Truman Proclamation in 1945 amounted to a renunciation of national jurisdiction over the continental shelf rather than an assertion of a claim of national jurisdiction, it would not have gained the immediate acceptance it did receive. Therefore, the less selfish and exclusive the asserted position, the greater is the need for early and decisive action.

An obstacle to prompt action by the United States is the currently poor perception of what type of regime would forward national interests in view of the lack of knowledge about the sea floor environment and its possible future uses.[24] Intensive study is underway within the Government to attempt to resolve this matter, and it has been given added urgency by the approval of Resolution No. 2340 by the 22nd General Assembly.[25] But whether the study results will be available in time to enable the United States to take the initiative is uncertain.

The United States appeared to be about to take the first step toward a unilateral announcement of position in 1966, when the President spoke at the commissioning of the oceanographic research vessel *Oceanographer.*[26] That statement has not, however, been followed up with further action. It may have been a trial balloon, although Ambassador Goldberg quoted it in the U.N. debate in the fall of 1967 and other U.S. spokesmen have continued to repeat it as the current U.S. position.[27] Additionally, it would appear to have been watered down by subsequent statements by official U.S. spokesmen who have asserted the need for further study before the United States can take an official position. Thus, although in 1966 the United States appeared to be on the brink of announcement of a unilateral position which would have done much toward shaping a regime for the deep sea floor, its position is now ambiguous. Judging by the intense interest which has been generated in the international community by the Malta proposal at the

22nd General Assembly and by discussion taking place in other forums, the time left to the United States to exercise its initiative may be running out.

Wait and See. For those who assert that we do not yet have enough information about the deep ocean floor and its possible uses, the obvious means of arriving at a regime for the seabed is on a case-by-case basis as man builds up experience in the environment. The argument in favor of this approach is not only that it is the pragmatic way of approaching any problem, but also the way in which the bulk of the law of the sea has been created over the centuries--each use or claim by one state being either acceded to or resisted by others in the international community, the process of action and reaction gradually creating a body of precedents which harden into the status of law.[28] The Judge Advocate General of the Navy has recently stated that the lesson of centuries of legal history is that "law cannot be prefabricated in abstract codification."[29]

Perhaps the most ardent advocate of letting the regime of the seabed develop by custom is Professor Myres McDougal. At the 1967 Law of the Sea Institute at the University of Rhode Island, at which he delivered the opening paper, he stated:

> Another obvious feature [of the international decisionmaking process] (and this accounts for my animus against conferences) is that historically most international law has been made by custom--by people creating expectations in each other about the requirements for future decision by simply co-operating or engaging in collaborative activities. Such co-operation creates expectations about the uniformities in decision that are expected and required. The great bulk of our inherited prescriptions in the law of the sea had their origin in this way, and when the community achieves legislative prescription of this kind there is some guarantee of its rationality. That the same persons--nation-state officials --must be both claimants against the community and decision-makers offers some safeguard against exaggerated, inflated claims. If what I claim I must concede to you, and if I am, in turn, a judge as well as a claimant, there is, the history of the law of the sea suggests, a chance to clarify common interest. In the present posture of world affairs, when a great conference is called and the representatives of the states gather around the table, they come with all their perspectives, with instructions about the total policies of their states, the policies that relate not only to the law of the sea but to other things. ... There are so many intrusions of considerations that have no relation to the law of the sea that even the people who are most competent to make the law of the sea are not allowed to do so. Hence, until we can, by traditional customary process, secure a greater consensus, a greater degree of clarity about what the common interests of peoples of the world are in relation to the important contemporary problems in the public order of the oceans, I think we should go very slow in encouraging a call for more conferences.[30]

Obviously, if this step-by-step method of proceeding could be achieved, it would be the most desirable way of proceeding. Unfortunately, there are several difficulties which would be encountered in accomplishing it. The first is that it reflects an essentially European and American concept of international law which the newly emerged states regard as designed to protect and defend strong and privileged position. It necessarily assumes that law will be created by the practices of those nations advanced and strong enough to carry out activities in the particular environment involved. The rapid decolonization of the world and the increasing weight of the new states in international affairs--at least at the U.N. General Assembly--create a substantial doubt that the traditional process can function as it did in the past.[31] The 1958 and 1960 Law of the Sea Conferences provide specific examples of the reluctance of the new states to be bound by traditional prin-

ciples created by the colonial powers before they were even in existence.[32]

The second difficulty is that a "wait and see" approach would probably lead toward exclusive claims by states, thus forfeiting any chance for the adoption of any other type of regime (such as shared use or an international regime). This result follows partly from the impetus of nationalism, as discussed above, and partly from the currently open-ended definition of the continental shelf.[33] The effects of the latter principle are already being felt, at least in United States practice. The Department of Interior has issued five oil leases for exploitation of areas off the Pacific coast of the United States which are beyond the 200 meter depth of the Continental Shelf Convention, thus bringing into play the second criterion of that Convention--exploitability. These areas are from 12 to 32 miles from shore and at water depths up to 1,500 feet.[34] A lease for sea floor phosphate nodule mining some 40 miles off the California coast in water depths to 4,000 feet has also been granted.[35] Additionally, as early as 1961, the Associate Solicitor, Division of Public Lands, Department of Interior, stated the opinion that by ratifying the Continental Shelf Convention, the United States had "... asserted rights to the seabed and subsoil as far seaward as exploitation is possible."[36] As other states see opportunities for possible profit in such leases, they too will be quick to follow the U.S. example. And what the United States claims for itself, it must be prepared to recognize on a reciprocal basis when claimed by other nations.

Still a third difficulty, one which has already been touched upon, is the strong impetus, both within and outside the United States, for international cooperation in the establishment of a regime now, while the world is at the threshold of profitable exploitation of the deep sea floor and before a new form of "colonial exploitation" is touched off. The resolutions of a number of committees and commissions calling for such action have been mentioned in Chapters I and IV. Additionally, the U.N. debate on the Malta resolution in the fall of 1967 showed a broad consensus in favor of the United Nations assuming jurisdiction of the problem under broad terms of reference.[37] In opposition to this position, official U.S. spokesmen have asserted that knowledge of the sea floor environment and U.S. interests therein are insufficiently known to permit the United States to take a position on a regime for the sea floor. That position is in remarkable parallel with the position taken by the U.S. Government with respect to a regime for outer space in the early years of the space age. For example, in 1958 the Legal Adviser of the Department of State testified before a Senate Committee that:

> ... we are inclined to view with great reserve any such suggestions as that the principles of the law of space should be codified ... until we ascertain many more facts with respect to conditions in space. Basically, it is the position of our Government that the law of space should be based upon the facts of space and that there is very much more than we have to learn about the conditions existing in space before we shall be able to say what shall be the legal principles applicable thereto.[38]

Nonetheless, only a little over 8 years later, the United States was not only a signatory, but also a prime advocate, of a treaty which codified a great number of legal rules applicable to outer space and the uses thereof, although, admittedly, it did not attempt to deal with issues "... not ripe for international negotiation."[39]

The U.N. Resolution may have set in motion a similar pattern of action for the law of the sea floor. That law thus may not be allowed the luxury of a leisurely, step-by-step development such as marked the creation of international

law in other areas in earlier centuries. From President Truman's Continental Shelf Proclamation in 1945, only 13 years elapsed until an international conference adopted the Continental Shelf Convention in 1958. With respect to outer space, the pace was even faster--less than 10 years from the birth of the space age in 1957 to the signing of the Outer Space Treaty in 1967. Even less time may be available for "inner space."

Summary. As has been seen with respect to outer space, a "wait and see" approach to the establishment of a legal regime eventually developed into the negotiation of a treaty embracing those elements where a consensus had developed and where the two major powers recognized it was in their mutual interest to accept mutual restraints.[40] Contrary to what might have been anticipated from earlier development of international law by custom and practice of states, this process did not occupy a very long period from first orbiting space vehicle to treaty signing. Although the Continental Shelf Doctrine started out on a different procedural path--unilateral declaration--the ultimate result was also a treaty and in almost as rapid a sequence. If deep sea technology progresses as fast as space technology--and as fast as its practitioners predict--the period between first action and final treaty signing may be even further compressed in the case of a regime for the deep seabed. Thus, the options on a method of proceeding will rapidly narrow.

VI--CONCLUSIONS

The explosion of undersea technology has placed man near the threshold of greatly increased activities on the seabed of the deep ocean. Until the present time, the nature and extent of those activities have been such that the answer to the question, "Whose is the ocean floor?" has not had a very great influence on such activities. Most seabed activities to date have been confined to the Continental Shelf. Those few activities which have been conducted in the deep ocean floor have not generally been of the type which have resulted in competitive assertions of exclusive rights or claims to jurisdiction. As man's activities on the deep ocean floor increase, however, the question of jurisdiction will become more important.

The Possible Drift Toward Coastal State Jurisdiction. The development which would probably create the greatest pressure for a resolution of the issue of jurisdiction would be the opportunity or need for mining the surface mineral deposits of the deep ocean floor. Because an entrepreneur must be assured sufficient rights to allow him to recover investment costs and gain a reasonable profit, the establishment of some system of jurisdiction is concomitant to exploitation.[1] In theory it should make little difference to the entrepreneur whether his rights flow from a national or an international body, his primary interest being in the scope of the rights granted. In actuality, however, a businessman is accustomed to operate under national jurisdiction. The undersea mining entrepreneur, therefore, will instinctively seek a national rather than an international sponsorship for his operating rights.[2] This in turn will cause him to influence coastal states toward assertion of claims to the natural resources in the areas in which he seeks to operate.

We have seen that nationalism already creates an inclination for states to extend their exclusive claims farther and farther to sea.[3] When this natural predisposition is reinforced by a prospect of monetary gain, the likely result is an extension outward of coastal state jurisdiction under the authority of the Continental Shelf Convention. The opened definition of the shelf in that Convention provides the opportunity for such

seaward creep of the outer boundary. Once begun, the trend would be difficult to reverse.[4] The ultimate result might be the division of the seabed among coastal states as discussed in Chapter IV. While such a regime might be beneficial from the point of view of the development of natural resources, it would pose serious dangers to the freedom of the high seas and to other uses of the seabed and superjacent waters. As coastal state claims to limited jurisdictions over segments of the high seas tend to ripen into more extensive jurisdictional claims, sometimes going as far as full sovereignty,[5] a regime based on coastal state jurisdiction, it is submitted, poses a threat to the freedom of the seas and is not a proper basis for a regime for the deep seabed.

If that proposition is accepted, it would logically follow that a "wait and see" approach, as currently advocated by spokesmen of the U.S. Government, would also be unacceptable, since it carries the danger of allowing a drift in the direction of coastal state jurisdiction. According to information provided to a Subcommittee of the House Foreign Affairs Committee, 15 nations have already licensed mining operations beyond the 200 meter depth.[6] The U.S. Department of Interior, in granting oil and mineral leases to ocean floor areas beyond the 200 meter depth, has reinforced this trend.[7] Thus, a "wait and see" approach, in addition to being somewhat impracticable in the light of the U.N. action already initiated, would be contrary to the concept of freedom of the seas and would not forward basic U.S. interests.

Unacceptability of Res Nullius and Res Communis Theories. A regime based on the *res nullius* concept has been found to provide a generally favorable climate for all the types of seabed activities considered in Chapter IV. There are, however, practical difficulties in applying the generally accepted "effective occupation" test to the seabed (which would be required by this doctrine);[8] moreover, this system would be unacceptable to the developing states, as debate before the First Committee of the General Assembly in the fall of 1967 has revealed.[9]

In an earlier day when international law was shaped almost exclusively by the practices of the dominant powers, this would not have been an obstacle to development of the law along these lines.[10] Today, however, the views of the smaller, less-developed states cannot be ignored. This is particularly true in the present case, because the U.N. General Assembly has already become deeply involved in the problem. The sheer number of the smaller states in that body gives them a significant influence on the outcome of issues there. Ten of the 35 members of the *Ad Hoc* Committee have gained their statehood since World War II. Thus, a regime based on the *res nullius* theory seems beyond attainment even if it were the desire of the United States and other major powers to seek such a regime.

The *res communis* concept has also been found to provide a favorable climate for a number of types of seabed activities, but the fact that it cannot offer the exclusive rights required for mineral resource development makes it an unattractive option. In addition, it suffers from the same unattractiveness to underdeveloped states as the *res nullius* concept, and it too would appear to be unattainable in today's international climate.

The Remaining Alternatives. Of the hypothetical regimes examined, only one emerges as a practical alternative to the unacceptable coastal state regime. That is some sort of international jurisdiction. In view of the dangers of the "wait and see" approach, the alternative methods available for arriving at such a regime appear to be unilateral proclamation and international negotiation.

The events in the United Nations in the fall of 1967 have narrowed the options available to the United States even farther. Having sponsored the idea of an *Ad Hoc* Committee to examine all aspects of the Malta proposal, it is now committed to the support of the efforts of that Committee.[11] Under those circumstances, it would appear that any assertions of U.S. position at this time would have to be within the framework of the *Ad Hoc* Committee. In essence, then, the course open to the United States is to take the lead in the discussions within the *Ad Hoc* Committee to develop a regime which is in the U.S. interest. The obstacle to accomplishment of this course of action is the officially asserted position that the United States is not yet prepared to take an official stand on the legal status of the seabed because of the primitive state of knowledge about the environment and the poorly perceived national interest therein. It is submitted, however, that if the United States is to have a decisive influence on the work of the Committee and the regime which may result from its work, it must formulate a positive national position rapidly. Otherwise, events will pass it by, permitting only reaction to proposals put forward by other states rather than taking the lead.

It is further submitted that the United States is not in such a state of ignorance as to prevent it from perceiving basic interests and guiding the proceedings in a direction which will protect those interests. Man's knowledge need not be perfect to permit him to anticipate needs and provide a basic framework of rules to govern relationships that may exist. Obviously, the less perfect the knowledge, the more flexible the framework must be. In this connection, it is appropriate to ask how much was known about the continental shelf at the time of the 1945 Truman Proclamation. The answer seems to be, "Not really very much." The press release which accompanied that Proclamation stated:

> Petroleum geologists *believe* that portions of the Continental Shelf beyond the three-mile limit contain valuable oil deposits. The study of subsurface structures associated with oil deposits which have been discovered along the Gulf Coast of Texas, for instance, indicates that corresponding deposits *may* underlie the offshore or submerged land. The trend of oil-productive salt domes extends directly into the Gulf of Mexico off the Texas Coast.[12]

Similarly, Secretary of Interior Harold L. Ickes, in an interview a month later, called the area "unexplored."[13] Dr. K.O. Emery of the Woods Hole Oceanographic Institution has stated in a recent monograph prepared for the Department of Interior that knowledge gained from exploration of the continental shelf by the petroleum industry, which began little more than 15 years ago, has probably produced knowledge of the shelf which exceeds the gains from all other sources. Nevertheless, he points out that even today, only the shelves adjacent to the most industrialized countries are at all well known. And even for these best known shelves, large gaps in knowledge exist.[14]

Another factor which should reduce apprehension about negotiation within the United Nations framework is the experience in connection with the Outer Space Treaty. That experience would tend to indicate that the U.S.S.R. and the United States can, where their interests are parallel, resist the injection of issues not ripe for international negotiation. The analysis in Chapter IV as well as the preliminary debate in the First Committee in the fall of 1967 indicate that in this area the interests of the United States and the Soviet Union seem to be generally parallel.

Outer Boundary of the Continental Shelf. A substantial initial benefit which could flow from negotiations within the *Ad Hoc* Committee would be the de-

velopment of an international consensus on an unambiguous outer boundary for the continental shelf before the trend toward exclusive coastal state claims can gather further momentum. Agreement on this issue is fundamental to any settlement of the legal status of the deep ocean floor. Otherwise, the boundary between the continental shelf and the deep ocean bed would be a constant source of uncertainty and tension. In this connection, the Continental Shelf Convention provides that it is open for revision 5 years after it enters into force. Since it entered into force in 1964,[15] it will be open for revision in 1969. A number of commentators have suggested the need for revision of the boundary at that time.[16]

The mere fact that the Convention is open for revision, however, does not mean that it can or will be revised. A revision would require the development of a consensus on a proper, fixed limit--a task that appears no closer to accomplishment today than it was in 1958, when the Convention was negotiated at Geneva. There are, however, two factors today which were not present in 1958 and would tend to suggest a more favorable climate for agreement. The first is that with the prospect of more than token activities on the seabed within the foreseeable future, there should be a greater appreciation on the part of the states that the problem is a real one, involving important national and international interests, and not just a discussion of abstractions. The second is the manner in which the problem is being approached. The *Ad Hoc* Committee is not adopting a purely "political" or "legal" approach to the problem but has been directed to examine the scientific, technical, economic, legal and other aspects of the seabed and ocean floor and to indicate practical means to promote international cooperation in the exploration, conservation and use of the seabed and ocean floor.[17] A hopeful sign for a favorable outcome on this aspect of the problem was the constructive nature of the debate in the First Committee. Implicit in the remarks of almost all the spokesmen was an appreciation of the danger of exaggerated, exclusive claims by coastal states.[18] The representative of Sweden suggested (and his views were shared by several other governments) that some measures should be taken to freeze the present situation and to prevent claims to the ocean bed until the deliberations had resulted in some conclusions.[19]

Final Remarks. The last year has seen the first tentative steps by the international community toward establishing the basis for a framework of law to govern the seabed and subsoil of the deep ocean areas. The effect of these steps has been to narrow the options open to the United States, both as to the character of an ultimate regime which it might seek to support its national interests and as to the method it might choose to reach that goal. Although the U.S. Government might have wished that this issue had not been raised within the United Nations quite so soon, the events are not wholly unfavorable to U.S. interests.

In creating the *Ad Hoc* Committee, the Assembly acted conservatively, steering away from a broad attack which might have led immediately to the drafting of a seabed treaty or to vesting jurisdiction over the seabed in the United Nations. Instead it directed the Committee's activities toward the fact-finding and study areas, asking that the results be reported to the 23rd General Assembly. Additionally, the First Committee debate had the beneficial effect of again focusing the members' attention on the adverse effects which would follow the unlimited extension of national jurisdictions over broad expanses of the sea bottom. If this should serve as a damper on the

incipient tendency on the part of states toward extending their continental shelf boundaries outward, that result alone would be a worthwhile accomplishment.

Nevertheless, the General Assembly action has created the need for timely action on the part of the United States Government to develop a national position on the issues raised by Resolution No. 2340 (XXII) in order that it may seize the initiative in the *Ad Hoc* Committee and within the 23rd General Assembly, to which the Committee must report. Unless it moves in a timely manner, it may find itself in a position where it can only react to what may be wholly unacceptable proposals from other states.

FOOTNOTES

I--THE PROBLEM EMERGES

1. United Nations, General Assembly, *Recent Developments in the Technology of Exploiting the Mineral Resources of the Continental Shelf,* A/Conf. 13/25 (New York: 1958), p. 18.

2. *Ibid.,* p. 24.

3. However, the Conference, by adopting a definition of the continental shelf which allows extension of its outer boundary to the limit of exploitability of resources, has led some to argue that the seabed has already been divided among the coastal states. United Nations, General Assembly, *Convention on the Continental Shelf,* A/Conf. 13/L.52 (New York: 1958), v. II, p. 132, Article 1. U.S. Treaties, etc., "Convention on the Continental Shelf," *United States Treaties and Other International Agreements* (Washington: U.S. Dept. of State, 1964), v. XV, pt. I, p. 471-526. This Convention is hereinafter cited as Continental Shelf Convention, Article 1. The effect of this provision will be discussed in Chapter II.

4. "Is There a Gold Mine Out in the Ocean?" *Business Week,* 9 April 1966, p. 90.

5. Larry L. Booda, "Oil Drilling Know-How, Hardware, Applied to Sub-Sea Mining and Engineering," *Undersea Technology,* February 1967, p. 26.

6. "Deep Earth Coring Program," *Undersea Technology,* December 1967, p. 11.

7. Harris B. Stewart, Jr., *Deep Challenge* (Princeton, N.J.: Van Nostrand, 1966), p. 153-160.

8. John L. Mero, *The Mineral Resources of the Sea* (New York: Elsevier, 1965), p. 242-272.

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12. Mero, p. 106.

13. Willard Bascom, "Mining in the Sea," Lewis M. Alexander, ed., *The Law of the Sea: Offshore Boundaries and Zones* (Columbus: Ohio State University Press, 1967), p. 160.

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15. Continental Shelf Convention, Article 2.

16. *Ibid.,* Article 1.

17. Claiborne deB. Pell, "Ownership and Jurisdiction of Extra-territorial Seabed and Superadjacent Waters," *Congressional Record,* 29 September 1967 (daily ed.), p. S13875-S13877.

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23. "Reservation of Sea-Bed and Ocean Floor for Peaceful Purposes," *UN Monthly Chronicle*, January 1968, p. 28.

II--THE CURRENT STATE OF THE LAW OF THE SEA

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2. Territorial Sea Convention, Article 6.

3. *Ibid.*, Article 1.

4. *Ibid.*, Articles 14-23.

5. U.S. Dept. of State, *Sovereignty of the Sea*, Geographic Bulletin No. 3 (Washington: 1965), p. 4.

6. Arthur H. Dean, "Department Seeks Approval of Conventions on Law of Sea," *The Department of State Bulletin*, 15 February 1960, p. 251.

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10. *Ibid.*

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14. Proclamation No. 2667, "Policy of the United States with Respect to the Natural Resources of the Subsoil and Sea Bed of the Continental Shelf," U.S. Laws, Statutes, etc., *U.S. Statutes at Large* (Washington: U.S. Govt. Print. Off., 1946), v. LIX, pt. II, p. 884.

15. "Proclamations Concerning United States Jurisdiction over Natural Resources in Coastal Areas and the High Seas," *The Department of State Bulletin*, 30 September 1945, p. 484.

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17. *Ibid.*, Article 3.

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19. High Seas Convention, Article 2.

20. *Ibid.*, Articles 4-6; Myres S. McDougal and William T. Burke, *The Public Order of the Oceans* (New Haven: Yale University Press, 1962), p. 745-746.

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22. Marjorie M. Whiteman, "Conference on the Law of the Sea: Convention on the Continental Shelf," *American Journal of International Law*, October 1958, p. 629.

23. United Nations, General Assembly, *Report of the International Law Commission Covering the Work of Its Eighth Session*, 23 April-4 July 1956, A/3159 (New York: 1956).

24. United Nations, General Assembly, *Official Records: Conference on the Law of the Sea*, A/Conf. 13/42 (New York: 1958), v. VI, p. 25. Documents of the Law of the Sea Conference are hereinafter cited as A/Conf. 13/ —, v. —, p. —.

25. E.g., Mr. Samad (Pakistan), A/Conf. 13/42, v. VI, p. 19; Mr. Mouton (Netherlands), *ibid.*, p. 37; Mr. Fattal (Lebanon), *ibid.*, p. 38; Mr. Gros (France), *ibid.*, p. 43.

26. E.g., Miss Whiteman (United States), *ibid.*, p. 19; Mr. Gros (France), *ibid.*, p. 2; Miss Gutteridge (United Kingdom), *ibid.*, p. 4; Mr. Nikolic (Yugoslavia), *ibid.*, p. 11; Mr. Lutem (Turkey), *ibid.*, p. 11.

27. E.g., Mr. Gohar (UAR), *ibid.*, p. 27.

28. E.g., Mr. Rubio (Panama), *ibid.*, p. 5; Mr. Miraflores (Spain), *ibid.*, p. 7; Mr. Barros (Chile), *ibid.*, p. 16; Mr. Lima (El Salvador), *ibid.*, p. 24.

29. E.g., Mr. Lee (Republic of Korea), *ibid.*, p. 23; Mr. Jhirad (India), *ibid.*, p. 12.

30. *Ibid.*, p. 9.

31. William T. Burke, *Ocean Sciences, Technology, and the Future International Law of the Sea* (Columbus: Ohio State University Press, 1966), p. 54-55; Shigeru Oda, *International Control of Sea Resources* (Leyden: Sythoff, 1963), p. 163; Bruce A. Harlow, "A Symposium on Limits and Conflicting Uses of the Continental Shelf," Alexander, ed., p. 182; John R. Brock, "Mineral Resources and the Future Development of the International Law of the Sea," *The JAG Journal*, September-October-November 1967, p. 39. Contra: John P. Craven, "Sea Power and the Sea Bed," *United States Naval Institute Proceedings*, April 1966, p. 36; Mero, p. 289.

III--SEABED AND SUBSOIL ACTIVITIES

1. U.S. Congress, House, Committee on Science and Astronautics, *Ocean Sciences and National Security*, Report No. 2028 (Washington: U.S. Govt. Print. Off., 1960), p. 44 (hereinafter cited as H.R. Report No. 2028); "Work beneath the Waves," *Time*, 19 January 1968, p. 68-75.

2. U.S. Dept. of the Navy, Office of the Secretary, *SECNAV Instruction 5430.79; Subj: Naval Oceanographic Program; Navy Department Organization and Responsibilities for* (Washington: 1966).

3. U.S. Dept. of State, "U.S. Reply to UN Questionnaire on Marine Science and Technology," Airgram No. CA-2523 to USUN, 2 October 1967.

4. H.R. Report No. 2028; U.S. Interagency Committee for Oceanography of the Federal Council for Science and Technology, *National Oceanographic Program, Fiscal Year 1967* (Washington: 1966), p. 14.

5. Claiborne deB. Pell, *Challenge of the Seven Seas*, p. 205-208; "Work beneath the Waves," p. 68-75. Merely glancing through the advertising section of any edition of one of the oceanography technical periodicals, such as *Undersea Technology*, will indicate the extent to which the industrial giants are involved in the ocean science field.

6. U.S. Laws, Statutes, etc., *U.S. Statutes at Large*, Public Law No. 89-454, 89th Congress (Washington: U.S. Govt. Print. Off., 1966), v. LXXX, p. 203.

7. *Ibid.*, section 3. The Secretary of Transportation replaced the Secretary of the Treasury upon transfer of the Coast Guard to the Department of Transportation in 1967.

8. "Work beneath the Waves," p. 68-75.

9. Harold L. James, Chief Geologist, U.S. Geological Survey, Department of the Interior, "Statement," H.R. Report No. 999, p. 117; Willard Bascom, "Mining the Ocean Depths," quoted *ibid.*, p. 119-124.

10. E.W. Seabrook Hull, "The Political Ocean," *Foreign Affairs*, April 1967, p. 493.

11. John P. Craven, "The Challenge of Ocean Technology to the Law of the Sea," *The JAG Journal*, September-October-November 1967, p. 35-36.

12. Mero, p. 252-272; David B. Brooks, "Deep Sea Manganese Nodules: from Scientific Phenomenon to World Resource," Lewis M. Alexander, ed., *The Law of the Sea: the Future of the Sea's Resources* (Kingston: University of Rhode Island, 1968), p. 32-41.

13. H.R. Report No. 999, Statement of Dr. Bascom, p. 132.

14. Athelstan Spilhaus, "Engineering the Oceans," *Undersea Technology*, May 1964, p. 30.

15. Francis T. Christy, "Statement," H.R. Report No. 999, p. 89.

16. Wilbert M. Chapman, "Fishery Resources in Offshore Waters," Alexander, ed., *The Law of the Sea: Offshore Boundaries and Zones*, p. 87.

17. *Ibid.* Dr. Chapman states that between 1954 and 1964 harvests doubled--from 2 percent to 4 percent of the potential production.

18. E.g., Claiborne deB. Pell, "Pell Wants Sea Harvest Controlled," *Providence Journal* 31 January 1968, p. 15:4; H.R. Report No. 2078, p. 45-51; Hull, *The Bountiful Sea*, p. 289.

19. Hull, *The Bountiful Sea*, p. 273-279; Pell, *Challenge of the Seven Seas*, p. 74-77; Tomoyoshi Ramanaga, "The Management of World Fisheries," Alexander, ed., *The Law of the Sea: the Future of the Sea's Resources*, p. 122-126.

20. E.g., Athelstan Spilhaus, *Turn to the Sea* (Washington: U.S. National Academy of Sciences, 1959), p. 31-35.

21. *Ibid.*, p. 41.

22. H.R. Report No. 2078, p. 54.

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24. Robert C. Cowen, *Frontiers of the Sea* (Garden City, N.Y.: Doubleday, 1960), p. 287.
25. Robert A. Frosch, "Military Uses of the Ocean," An Address at the Second Mershon-Carnegie Conference on Law, Organization and Security in the Use of the Ocean, Columbus, Ohio: 7 October 1967.
26. *Ibid.*, p. 4.
27. *Ibid.*, p. 7-8.
28. *Ibid.*, p. 10.
29. *Ibid.*, p. 11.
30. *Ibid.*, p. 20.
31. Pell, *Challenge of the Seven Seas*, p. 1-24. 145-147.

IV--ALTERNATIVE REGIMES FOR THE SEABED

1. John C. Westlake, *International Law* (Cambridge, Eng.: Cambridge University Press, 1904), v. I, p. 96-98.
2. Lassa F.L. Oppenheim, *International Law*, 8th ed., H. Lauterpacht, ed. (London: Longmans, Green, 1955), v. I, p. 582-587.
3. High Seas Convention, Article 2.
4. See, for example, Oppenheim, p. 628-629, and authorities cited therein.
5. C. John Colombos, *International Law of the Sea*, 6th rev. ed. (London: Longmans, 1967), p. 159.
6. *Ibid.*, p. 161.
7. Continental Shelf Convention, Article 3.
8. Although the sovereignty of a state over territory is not the equivalent of ownership in the domestic sense, international law does not generally make this distinction. Therefore, when a state asserts its claim to territory, the claim is equivalent to the assertion of both sovereignty and ownership. The ownership (title) could be either in the state or its citizens--international law does not take cognizance of this distinction. Charles G. Fenwick, *International Law*, 4th ed. (New York: Appleton-Century-Crofts, 1965), p. 403. In this chapter, the terms "title," "sovereignty," and "ownership" are used in their international law sense.
9. Oppenheim, p. 555.
10. C.H.M. Waldock, "Disputed Sovereignty in the Falkland Islands Dependencies," *The British Yearbook of International Law 1948* (London: Oxford University Press, n.d.), p. 311.
11. Waldock, "The Legal Basis of Claims to the Continental Shelf," *The Grotius Society Transactions for the Year 1950*, quoted in Marjorie M. Whiteman, *Digest of International Law* (Washington: U.S. Govt. Print. Off., 1963), v. II, p. 1039-1040.
12. *Ibid.*
13. H. Lauterpacht, "Sovereignty over Submarine Areas," *The British Yearbook of International Law 1950* (London: Oxford University Press, 1951), p. 418.
14. *Ibid.*, p. 429.
15. Richard Young, "The Legal Status of Submarine Areas beneath the High Seas," *American Journal of International Law*, April 1951, p. 230.
16. *Ibid.*
17. Kenneth O. Emery, "Geological Aspects of Sea Floor Sovereignty," Alexander, ed., *The Law of the Sea: Offshore Boundaries and Zones*, p. 139.
18. U.S. Called Far Ahead in 'Race' to Tap Wealth Hidden in Oceans," *Newport* (Rhode Island) *Daily News*, 12 December 1967, p. 9:6.
19. "Reservation of Sea-Bed," p. 29-32.
20. High Seas Convention, Article 2.
21. United Nations, *Yearbook of the International Law Commission 1955*, A/CN.4/Ser.A/1955 (New York:1960), v. I, p. 222.
22. McDougal and Burke, p. 751-763; United Nations, General Assembly, *Report of the International Law Commission*, A/3159, Article 27, commentary, para. 2.
23. High Seas Convention, Articles 5, 10, 12, 24 and 27.
24. *Ibid.*, Article 6.
25. McDougal and Burke, p. viii.
26. Francis T. Christy, Jr., "The Sea's Wealth in Fisheries," Alexander, ed., *The Law of the Sea: Offshore Boundaries and Zones*, p. 107; Christy, "A Social Scientist writes on Economic Criteria for Rules Governing the Exploitation of Deep Sea Minerals," *The International Lawyer*, January 1968, p. 235.
27. Christy, "The Sea's Wealth in Fisheries," p. 111.
28. *Ibid.*

29. Mero, p. 272; Brooks, p. 36.

30. Christy, "Alternative Regimes for the Minerals of the Sea Floor," Unpublished Paper, American Bar Association National Institute on Marine Resources, Long Beach, Calif.: 8 June 1967, p. 5.

31. High Seas Convention, Article 2.

32. Above, p. 22.

33. Although it could be argued that a nation's claim over the continental shelf is extended only by its own capability to exploit, the better opinion supports the view that a capability of *any* nation to exploit to a particular depth extends the claim of *all* nations out to the same depth. Arthur H. Dean, "The Law of the Sea Conference and Its Aftermath," Alexander, ed., *The Law of the Sea: Offshore Boundaries and Zones*, p. 245.

34. For example, does exploitability mean merely that there is a capability to remove mineral ores from the bottom, or does it mean that the operation must be economically profitable? Neither the Convention itself nor its negotiating history provides an answer to this question.

35. Wilbert M. Chapman, "Problems of the North Pacific and Atlantic Fisheries," Paper presented at the Annual Meeting, Fisheries Council of Canada, Montreal: 10 May 1967, cited in Christy, "The Sea's Wealth in Fisheries," p. 14.

36. See Table at p. 161-163, H.R. Report No. 999; see also Lauterpacht, "Sovereignty over Submarine Areas," p. 387.

37. E.g., Quincy Wright, "A Symposium on Limits and Conflicting uses of the Continental Shelf," Alexander, ed., *The Law of the Sea: Offshore Boundaries and Zones*, p. 185; Clark M. Eichelberger, "The Promise of the Seas' Bounty," *Saturday Review*, 18 June 1966, p. 21.

38. E.g., Committee on Conservation and Development of Natural Resources, White House Conference on International Cooperation, p. 145-146; Commission to Study the Organization for Peace, p. 39-40.

39. E.g., Senator Pell, above, p. 7. Representatives Donald M. Fraser and Benjamin S. Rosenthal, "Separate View," H.R. Report No. 999, p. 6R.

40. E.g., the Malta Resolution previously cited. In the debates at the 22d General Assembly, the Governments of Afghanistan, China, Cyprus, Ghana, India, Libya, Nigeria, Sierra Leone, Somalia, Trinidad and Tobago and the UAR emphasized that future exploitation of the ocean floor should primarily benefit the developing countries. "Reservation of Sea-Bed," p. 32.

41. Commission to Study the Organization for Peace, p. 37-38.

42. "Reservation of Sea-Bed," p. 29.

43. Pell, "Ownership," p. S13875-S13877.

44. Wright, p. 185.

45. These are summarized in H.R. Report No. 999, p. 1-2.

46. S.J. Resolution 111, S. Resolution 172 and S. Resolution 186, 90th Congress, 1st Session (1967), quoted in U.S. Congress, Senate, Committee on Foreign Relations, *Governing the Use of Ocean Space*, Hearings (Washington: U.S. Govt. Print. Off., 1967), p. 1-7.

47. H.R. Report No. 999, p. 143.

48. *Ibid.*, p. 151.

49. *Ibid.*, p. 188.

50. Representatives Thomas M. Pelly, Don Fuqua, *ibid.*, p. 71; Resolution of the National Convention of the American Legion, Portland, Oregon, 24-27 August 1965, quoted in letter from Harold E. Stringer to Hon. Dante B. Fascell, *ibid.*, p. 75.

51. Letter from C.B. Hamm, Executive Director, National Oceanography Association, to Hon. Dante B. Fascell, 22 September 1967, *ibid.*, p. 71; letter from Allan Shivers, President, Chamber of Commerce of the United States, to Hon. Dante B. Fascell, 14 September 1967, *ibid.*, p. 74.

52. Letter from C.B. Hamm, *ibid.*, p. 73.

53. "Reservation of Sea-Bed," p. 30-31.

54. Lyndon B. Johnson, "Effective Use of the Sea," *Weekly Compilation of Presidential Documents*, 18 July 1966, p. 931.

55. Arthur H. Goldberg, "Statement on the Question of the Reservation Exclusively for Peaceful Purposes of the Sea Bed and Ocean Floor," quoted in Senate, Committee on Foreign Relations, Hearings, p. 8.

V--ALTERNATIVE PROCEDURES FOR ESTABLISHING A LEGAL REGIME

1. The term "wait and see" is taken from the position initially adopted by the U.S. Government in the early years of the space age (1958-1959) when it was resisting

nongovernmental pressures to announce its position on a legal regime for outer space. See Loftus E. Becker, Legal Adviser, Department of State, "The Control of Space," an Address before the 81st Annual Meeting of the American Bar Association, Los Angeles, Calif., 26 August 1958, reprinted in *The Department of State Bulletin*, 15 September 1958, p. 416-419.

2. U.S. Treaties, etc., "The Antarctic Treaty," *United States Treaties and Other International Agreements* (Washington: U.S. Dept. of State, 1961), v. XII, pt. I, p. 794-829.

3. U.S. Treaties, etc., "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies," *United States Treaties and Other International Acts Series 6347* (Washington: U.S. Dept. of State, 1967).

4. E.g., Senator Pell, "Ownership," p. S13875-S13877; Statement of the Representative of Malta before Committee I, U.N. General Assembly, 22d Session, "Reservation of Sea-Bed," p. 29-30; Wright, p. 185.

5. For example, the outer space treaty did not attempt to address the question of the height to which a nation's sovereignty over its superjacent airspace extends, a question which many considered crucial for prompt resolution early in the "space age."

6. E.W. Seabrook Hull, "The Political Ocean," p. 492; Statement of Joseph Cisco, Assistant Secretary of State, Senate, Foreign Relations Committee, Hearings, p. 24-25.

7. Pell, "Ownership," p. S13876; Commission to Study the Organization of Peace, p. 36 ff; Eichelberger, p. 21.

8. Robert D. Hayton, "The Antarctic Settlement of 1959," *American Journal of International Law*, April 1960, p. 349.

9. The Treaty does not dispose of existing territorial claims on the continent of Antarctica; it merely freezes them in the status in which they were at the time of signing. "The Antarctic Treaty," Article IV.

10. Arthur J. Goldberg, "International Law in the United Nations," Address before the Association of American Law Schools, Washington, D.C.: 29 December 1966, reprinted in *The Department of State Bulletin*, 23 January 1967, p. 142.

11. *Ibid.* Emphasis supplied.

12. Dean, "The Law of the Sea Conference, 1958-1960, and Its Aftermath," p. 244-245.

13. "Reservation of the Sea-Bed," p. 28.

14. The details of early U.N. action in this field are comprehensively reviewed in four articles in the *American Journal of International Law* as follows: Howard J. Taubenfeld, "Consideration at the United Nations of the Status of Outer Space," April 1959, p. 400; Philip C. Jessup and Howard J. Taubenfeld, "The United Nations Ad Hoc Committee on the Peaceful Uses of Outer Space," October 1959, p. 877; James Simsarian, "Outer Space Co-operation in the United Nations," October 1963, p. 854; Simsarian, "Outer Space Co-operation in the United Nations in 1963," July 1964, p. 717.

15. Goldberg, "International Law in the United Nations," p. 141-142.

16. "U.N. General Assembly Endorses Outer Space Treaty," *The Department of State Bulletin*, 9 January 1967, p. 78.

17. "Outer Space Treaty Signed by 60 Nations at White House Ceremony," *The Department of State Bulletin*, 20 February 1967, p. 266.

18. Oppenheim, v. I, p. 585.

19. William T. Burke, *Ocean Sciences, Technology, and the Future International Law of the Sea* (Columbus: Ohio State University Press, 1966), p. 90.

20. *Ibid.*

21. H.R. Report No. 999, p. 161-163.

22. U.S. Dept. of State, *Sovereignty of the Sea*, p. 1-2.

23. Burke, *Ocean Sciences*, p. 90.

24. Above, p. 71.

25. H.R. Report No. 999, p. 52.

26. Above, p. 76.

27. Goldberg, Senate, Foreign Relations Committee, Hearings, p. 8; Wilfred A. Hearn, Judge Advocate General of the Navy, "Principles of International Legal Development," *The JAG Journal*, September-October-November 1967, p. 47; Herman Pollack, Director, International Scientific and Technological Affairs, Department of State, "National Interest, Foreign Affairs, and the Marine Sciences," *The Department of State Bulletin*, 12 February 1968, p. 213.

28. McDougal and Burke, p. vii-xii.

29. Hearn, p. 45.

30. McDougal, "International Law and the Law of the Sea," p. 13-14.

31. R.P. Anand, "Role of the 'New' Asian-African Countries in the Present International Legal Order," *American Journal of International Law*, April 1962, p. 383.

32. 1958: Statements of Mr. Ba Han (Burma), A/Conf. 13/39, v. III, p. 4; Mr. Subardjo (Indonesia), *ibid.*, p. 13. 1960: Mr. U Mya Sein (Burma) United Nations, General Assembly, *Official Records: Second Conference on the Law of the Sea*, A/Conf. 19/9, p. 102; Mr. Sen (India), *ibid.*, p. 190; Mr. Hassan (UAR), *ibid.*, p. 308. See also Arthur H. Dean, "The Geneva Conference on the Law of the Sea: What was Accomplished," *American Journal of International Law*, October 1958, p. 607; Dean, "The Second Geneva Conference on the Law of the Sea: The Fight for the Freedom of the Seas," *ibid.*, October 1960, p. 757.

33. Continental Shelf Convention, Article 1.

34. H.R. Report No. 999, p. 164.

35. Charles F. Luce, Under Secretary of Interior, "The Development of Ocean Minerals and the Law of the Sea," Address at American Bar Association National Institute on Marine Resources, Long Beach, Calif.: 8 June 1967, reprinted in H.R. Report No. 999, p. 231.

36. Memorandum Opinion, 5 May 1961, reprinted in H.R. Report No. 999, p. 165.

37. "Reservation of the Sea-Bed," p. 28-34; Senate, Foreign Relations Committee, Hearings, p. 28.

38. Loftus E. Becker, "Major Aspects of the Problem of Outer Space," Statement before the Special Committee on Space and Astronautics, U.S. Senate, 14 May 1958, reprinted in *The Department of State Bulletin*, 9 June 1958, p. 962.

39. Goldberg, "International Law in the United Nations," p. 142.

40. *Ibid.*, p. 141.

VI--CONCLUSIONS

1. Spilhaus, "Engineering the Oceans," p. 30.

2. Letter from C.B. Hamm, Executive Director, National Oceanography Association to Hon. Dante P. Fascell, 22 September 1967, printed in H.R. Report No. 999, p. 72-73; letter from John H. Clotworthy, President, National Oceanography Association, to Hon. J.W. Fulbright, 13 December 1967, printed in Senate, Hearings, p. 66-67.

3. U.S. Dept. of State, *Sovereignty of the Sea*, p. 1-2.

4. *Ibid.*

5. Christy, "The Sea's Wealth in Fisheries," p. 14.

6. H.R. Report No. 999, p. 89.

7. *Ibid.*, p. 89, 231.

8. Above, p. 46 ff.

9. "Reservation of the Sea-Bed," p. 28-32.

10. Anand, p. 383.

11. Arthur J. Goldberg, "Statement on the Question of the Reservation Exclusively for Peaceful Purposes of the Sea-Bed and the Ocean Floor," p. 8-10.

12. "Proclamations Concerning United States Jurisdiction Over Natural Resources in Coastal Areas and High Seas," *The Department of State Bulletin*, 30 September 1945, p. 484. Emphasis supplied.

13. "Links Fate of U.S. to Oil Under Sea," *The New York Times*, 4 November 1945, p. 23:1.

14. K.O. Emery, *Atlantic Continental Shelf and Slope of the United States*, Geological Professional Paper 529-A (Washington: U.S. Govt. Print. Off., 1966), p. A1-A4.

15. U.S. Dept. of State, *Treaties in Force* (Washington: 1968), p. 296.

16. See, e.g., Alexander, ed., *The Law of the Sea: Offshore Boundaries and Zones*, p. 186; Pell, "Ownership," p. S13875-S13877.

17. "Reservation of the Sea-Bed," p. 28.

18. *Ibid.*, p. 28-34.

19. *Ibid.*, p. 30.

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