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INTERNATIONAL SEABED REGIME: INDIA'S INTERESTS AND POLICY OPTIONS

I. Introduction

RISING demands for economic resources to support a growing population and rapid development of technology have drawn attention towards the ocean—man's last frontier. Ocean space is now being used more extensively than ever, not only for conventional purposes but also for more recently developed resources. The presence of manganese nodules on the ocean floor has been known since the voyage of the *Glomar Challenger* in the 1870's, but it is only in the past few years that the developments in seabed mining technology have shown promise of transforming this geological phenomenon into a valuable economic resource. Existing international maritime law and institutions are simply not adequate to govern the manifold usages and resources and must be changed in order to avoid potential conflicts in the distribution of yet unappropriated wealth of the oceans. The purpose of this paper is to examine India's alternatives from the perspective of her national interest with respect to the development of a new regime to govern the exploitation of the resources in the seabed beyond national jurisdiction. The formulation of India's position with regard to a regulatory framework for the seabed must take into account not only the known resources but also the potential future discoveries and technological breakthroughs.

After a brief mention of the current world concern with the regulation of international seabed resources, and the salient features of seabed mineral

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production, we discuss India's perspective and goals on this issue. The paper concludes with an analysis of alternative seabed regimes from India's perspective.

Need for an International Regime

While the inadequacy of the existing laws of the sea in resolving current problems had been realized for some years, the urgency and gravity of the problem posed by the existence of exploitable resources on the seabed was dramatically brought home by Ambassador Arvid Pardo of Malta. In his address to the United Nations General Assembly in 1967, Pardo called for reserving the seabed and the subsoil of the area beyond national jurisdiction for peaceful purposes. His speech stimulated the interest of the international community in the seabed and its vast economic resources. An ad hoc seabed committee was set up to examine the manifold aspects of this issue. This was made a permanent committee in 1968. Early in the debates, there was a general consensus that there is an area of the seabed beyond the national jurisdiction of all states which is the common heritage of all mankind and that the resources of this area should be exploited so as to prevent undesirable consequences to this existing land-based producers of such resources. On December 17, 1970, the U.N. General Assembly passed Resolution 2750 C (XXV) calling for a Conference on the Law of the Sea in 1973 to deal, among other things, with the precise definition of the international area and the establishment of an equitable international regime to promote the orderly development of the area and the resources of the seabed beyond the limits of national jurisdiction. The Third U.N. Conference on the Law of the Sea, the largest international conference ever held, met in Caracas, Venezuela, in the summer of 1974, but failed to reach any agreements in spite of intense deliberations. More sessions have been scheduled for 1975 at Geneva, in which attempts to arrive at agreements on the many complex issues on the agenda will continue.

With regard to the demarcation of the area beyond national jurisdiction, there are several indications of a growing consensus¹ in favor of extending the exclusive national jurisdiction of the coastal state to 200 miles from shore or a depth of 200 meters, whichever is further. Such a demarcation of national boundaries will extend national control over seabed resources up to the outer edge of the submerged continental land mass, generally speaking, and restrict the international area to the abyssal plains. This restriction in area has important implications for the nature of the proposed international regime which will be discussed in the next section.

1. R.P. Anand, "Interests of Developing Countries and Developing Law of the Sea," in *Annals of International Studies*, 1973. Geneva: Alumni Association of the Graduate Institute of International Studies, 1973.

Resources on the Seabed

Under the present state of knowledge and in the foreseeable future, manganese nodules are the only resource that can be exploited economically at water depths of 2,500 meters or more. The possibility of fossil fuels on the abyssal plains has been widely discounted, but even if they were known to exist, a very considerable advance in technology combined with much higher prices would be required to make their extraction economical at depths of 2,500 meters. Other known minerals on the seabed cannot be classified as economic resources for the same reason.² In the following discussion, we shall restrict our attention to manganese nodules without ruling out the possibility that exploitation of other minerals may become an economic proposition at a future date.

Distribution and Nature of Manganese Nodules

The amount of manganese nodules that fall under the jurisdiction of the international seabed regime would not change significantly if the area of national jurisdiction is extended from 200 meters depth to 2,500 meters depth.³ In other words, there are no significant deposits of manganese nodules on the continental margin. It has been estimated that nodules of high commercial potential in sufficient quantities are most likely to occur at depths of over 3,600 meters.⁴

Manganese nodules have been found extensively on the abyssal plains of all oceans. The size, density, composition and concentration of nodules differ considerably from one site to another. They range in size up to about 15 centimeters in diameter. Their concentration is known to be as high as 5 grams per square centimeter of ocean floor.⁵ The rich dry nodules likely to be mined first contain approximately 30 per cent manganese, 1.5 per cent copper, 1.5 per cent nickel and 0.3 per cent cobalt.⁶ Other major

2. "...however, it will be many years before anyone has the capability of producing oil from such a depth. While we can speculate on the occurrence of a variety of mineral deposits in the deep ocean, thus far the only known deposits in this area of the sea which show great economic potential are the manganese nodules." J.L. Mero, "A Legal Regime for Deep Sea Mining," *San Diego Law Review*, 7, 3(July, 1970), p. 196.

3. F.L. LaQue, "Prospects for and from Deep Ocean Mining," in *Hearings before the Subcommittee on International Organizations and Movements of the Committee on Foreign Affairs of the House of Representatives*, 92nd Cong., April 10 and 11, 1972, p. 60.

4. Report of the Secretary General, *Mineral Resources of the Sea*, April 26, 1971, E/4973, p. 33.

5. See John L. Mero, *The Mineral Resources of the Sea* (New York: Elsevier Publishing Co., 1965), pp. 155-77 for information on distribution and concentration of manganese nodules.

6. Report of the Secretary General, *Possible Impact of Seabed Mineral Production in the Area Beyond National Jurisdiction on World Markets*, May 28, 1971, A/AC. 138/36, p. 53.

elements present, iron (14 per cent), silica (9 per cent), and aluminium (3 per cent), have little chance of ever becoming economic resources. Whether production of manganese from nodules will be economical is not yet certain primarily because the market price of manganese is already quite low and there are sufficient land reserves of manganese. After extraction of copper, nickel and cobalt, the incremental cost of producing manganese by removing the remaining metals is considered to be the most expensive stage of nodule processing. Moreover, high purity manganese which will be produced has only a limited market.⁷ Recovery of metals from manganese nodules is therefore quite likely to be limited to copper, nickel and perhaps cobalt. One company, Deepsea Ventures, Inc., does, however, claim that it will recover and market manganese from nodules.⁸ Since even a simple commercial operation is likely to have a substantial impact on the manganese prices, we do not rule out the possibility of manganese production in the following discussion.

Economics of Manganese Nodule Mining

Only a relatively small part of the ocean floor has been explored for the existence and composition of manganese nodules so far. Very little research has been conducted in the Indian Ocean because none of the littoral states are actively engaged in research to exploit minerals from the seabed. The best known sites for mining of manganese nodules are in the Pacific Ocean. It is certainly possible that further research may yield equally or more attractive sites in the Indian Ocean also. The mere existence of manganese nodules in an area of the seabed does not make it an attractive mining site. In order for mining to be economically feasible, the nodules of appropriate composition should be sufficiently concentrated in the area. In addition, favorable meteorological and sea state conditions; proximity to potential markets, refining sites and port facilities; depth of water; topography and soil mechanics of the seabed at the mining site are some of the other important considerations which, in combination, would make certain sites much more attractive for commercial exploitation than others.

Another feature of the manganese nodules is that the relative proportions in which they contain various metals are grossly out of balance with the world demand for various metals. According to a U.N. study,⁹ if all four metals, nickel, cobalt, manganese and copper, are extracted from the nodules, 38, 7, 27, and 388 million tons of nodules respectively would be required to meet the current world demand for each of the four metals. In other words, if enough nodules are produced to meet the current world demand for copper; ten times as much nickel, fifty-five times as much

7. LaQue, "Prospects," p. 57.

8. Arnold J. Rothstein, "Deep Ocean Mining: Today and Tomorrow," *Columbia Journal of World Business*, VI, 1(Jan.-Feb., 1971), p. 46.

9. Report of the Secretary General, A/AC.138/36, pp. 52-53.

cobalt and fourteen times as much manganese as is required to fulfil the current world demand could be extracted from the same nodules. The effect of seabed production on the market prices of various metals will be different. The pressure of prices will be focussed mainly on cobalt, to a smaller extent on nickel and to a still smaller extent on manganese if manganese extraction is found economically feasible. Since the demand for copper is very high, the effect on copper prices will be small, if any, until nodule production reaches a very high level. A major implication is that profits cannot be calculated by merely adding the value of the expected tonnage of metals at the current prices.

The economics of seabed mining operations depend on the initial investment, operating costs and scale of operation which affects the price of the output. Initial investment in a seabed mining operation has been estimated between U.S. \$30 million to \$300 million with the probable figure in the neighbourhood of U.S. \$100 million.¹⁰ Since the initial investment is not very sensitive to the scale of production, per unit investment declines for plants of higher capacity.¹¹ According to Mero, initial investment per unit production might be declining even when nodule production is as high as 10,000 tons per day. Unit operating costs decline over a considerable range of output and are not very sensitive to the depth of water where nodules are mined.¹² The combination of high initial costs and low operating costs at high rates of output strongly suggest that each mining venture will have to be relatively large, in the range of 2,000 tons to 10,000 tons of dry nodules per day, in order to be able to produce metals at a reasonable low cost. This places each seabed mining operation in the scale of the largest onshore mines. As discussed above, production at such a scale may seriously affect the market price of the output and undermine the economic feasibility of the enterprise, especially if several competing enterprises of large size enter the market. Though the available estimates are quite uncertain, Brooks¹³ has suggested that the amount of metals put on the market by a single "medium-sized" operation may be so large as to reduce the manganese, cobalt and nickel prices by 40 per cent, 35 per cent and 8 per cent, respectively.

The corollary to this economic reality is that a regulatory structure would be necessary not only to preserve the interests of the existing producers but also to ensure orderly exploitation of the resources of the seabed. The world consumption and demand patterns would change for the nodule metals as a result of a drop in price. But there would still be

10. David B. Brooks, *Low Grade and Non-conventional Sources of Manganese* (Baltimore: The Johns Hopkins Press for Resources of the Future, Inc., 1966), p. 99.

11. See Mero, *Mineral Resources*, pp. 268-70.

12. *Ibid.*, p. 290. Also, see H.D. Hess, "The Ocean: Mining's Newest Frontier," *Engineering and Mining Journal*, 166 (August, 1965), pp. 95-96.

13. Brooks, *Sources of Manganese*.

pressure on prices as more competitors would enter the market. High investment and low operating costs would encourage overcapitalization and overproduction that could totally disrupt the market and make it necessary to provide for some controls to minimize the adverse effects on the economies of land-based producers—most of which are developing countries. There would also be intense competition for particular sites because of the great variance in value, the large size of the holding and the impact of even a single production on prices.¹⁴ The image of *laissez faire* neatly regulating entry into the market may well be elusive. Countries might be willing to commence and expedite rate of production in order to minimize their dependence on strategic raw material, controlled by unfriendly or well organized producer states, or subject to the hazards of long distance transport. Another motivation may be to compete better in the market with assured self-sufficiency of raw material vis-à-vis other competitive industrial states.

An important consideration worth keeping in view is the timetable of technological developments in deep sea mining. Until almost 1970, commercial exploitation of manganese nodules was not considered feasible before 1985. Rapid developments in recent months have changed this perspective. Deepsea Ventures, a U.S. corporation, has tentatively reserved 1976 as the year to commence mining of nodules.¹⁵ Mero also states that full-scale production of nodules will occur within the next few years.¹⁶ According to a U.N. study, "commercial production of manganese nodules may well be in operation by 1975."¹⁷ From these estimates combined with newspaper accounts of the activities of several corporations engaged in research and development in the U.S. and Western Europe, full-scale mining of nodules from the oceans looks like a certainty by the mid-seventies. These developments add urgency to the negotiating process and must be reckoned with by other nations who might be faced with a *fait accompli* if the agreement on an international seabed regime is not reached in time.

II. Considerations for Indian Policy

It is pertinent here to assess the magnitude of India's immediate and

14. "Competition for the deposits most economic to mine will become intense under such circumstances and there will be no end of claim jumping, piracy and trouble unless some legal regime is initiated to forestall such happenings." See Mero, "A Legal Regime," p. 497.

15. "Pacific Manganese Nodules Mining Venture," *Mining Magazine* (March, 1972), p. 228.

16. John L. Mero, "Potential Economic Value of Ocean Floor Manganese Nodule Deposits," Conference/Workshop on Ocean Manganese Deposits, Arden House, Columbia University, January 20-21, 1972.

17. Study prepared by the Secretary General, *Uses of the Sea*, April 28, 1972, E/5120, p. 18.

long-run interests in the seabed resources. The immediate possibility of extraction of manganese, copper, nickel and cobalt concerns India either as a producer or consumer or exporter of these minerals. In 1970, India produced 1.7 million tons of manganese ore worth Rs. 75 million.¹⁸ About 75 per cent of this ore was exported for Rs. 111 million which constituted approximately one per cent of India's exports. Indian manganese ores have a high phosphorous content which is expensive to eliminate. In addition, due to the low manganese content and the discovery of vast land deposits of high-grade manganese in Gabon, Ghana and Brazil, Indian ores have been losing ground in the international markets. India owns less than three per cent of the known land-based world reserves, but her share of world production in 1971 was eight per cent.¹⁹ Given the relatively poor quality (only 1/4 of her reserves are estimated to be of high grade) and faster than average rate of exploitation, India's proportional share in world production is most likely to go down. The demand for manganese is fairly inelastic. Since the absolute world demand for manganese is increasing at only about five per cent a year,²⁰ India's exports of manganese are not likely to increase in the future. The maximum loss to India as a producer and exporter of manganese will be incurred if sea-based production of manganese is so inexpensive and abundant that India loses her markets for manganese exports. Thus the loss of foreign exchange from the drop of exports will be to the tune of Rs. 150 million. Since almost half the added value of ores comes from scarce transportation facilities which could be put to alternative use, the net economic loss to India, mainly in the form of unemployment, will be on the order of Rs. 80 million. In addition, a loss of Rs. 20 to 50 million may be incurred due to the loss of ferromanganese exports.

As a consumer of manganese, India is unlikely to benefit from low prices of sea-based manganese for some time. Geographical proximity of her land-based reserves to the main consuming centers minimizes the cost of land-produced manganese. The low cost of labor combined with the capital intensive nature of sea-based production are unlikely to make manganese production from the sea competitive to land-based production in India. Therefore, the likely benefits to India from manganese production from the sea will be negligible.

The second, and probably the most important metal obtainable from nodules is copper. India produces only about 15 per cent of her requirements and imports the rest. Such imports amounted to Rs. 410 million in 1969-70. There is little chance that India could ever become a

18. *Statistical Abstract, India 1970* (Delhi: Manager of Publications, 1972).

19. United Nations, *Yearbook of International Trade Statistics*, 1972.

20. Report of the Secretary General, A/AC. 138/36, p. 26.

net exporter of copper. As a consumer, India will benefit from a decline in prices when copper from the oceans becomes available. However, as pointed out earlier, the world market for copper is relatively large while the copper content of nodules is very low; consequently, the price of copper is least likely among the four metals to be affected by the new source. But production of copper from the oceans, clearly, will not be injurious to India's direct economic interests. Since production of this strategic metal is concentrated in a few countries of the world (U.S., U.S.S.R., Chile, Zambia, Canada, Zaire and Peru) any addition to the number of producing states will be advantageous to India. With the world trend towards formation of cartels among suppliers of important raw materials and consequent rises in prices, incentives associated with increased supply of copper and self-reliance in copper are only likely to increase. The facilitation of production of copper from the seas is, therefore, likely to be of direct economic advantage to India.

A third metal obtainable from the nodules is nickel. Though the percentage nickel yield of nodules is about the same as the copper yield, the world market for nickel is only one-tenth as large and likely to remain so at the current prices. As was pointed out earlier, an attempt to produce nodules to supply a substantial part of the world demand for copper will flood the market with nickel and to an even greater extent with cobalt and drive the prices of these metals to a very low level. Unless the price of copper or demand for nickel and/or cobalt rises substantially, it may not be profitable to produce nodules in very large quantities. Both nickel and cobalt are used as alloying elements in steel and for some purposes, cobalt can be used as a nickel substitute. India produces neither of these metals and imports all of her requirements. Therefore, from a consumer viewpoint, the decline in prices of these metals as a result of sea-based production will benefit India. If the capital and technology for direct investment in ocean mining can be put together, India may also look for self-sufficiency in these materials. India's present requirements, however, are too small to consume the production of an economically-sized operation as discussed earlier.

Besides protecting her direct economic interests discussed above, a rational Indian policy towards a seabed regime should consider several other factors. Such considerations too will almost inevitably impinge on the economic welfare of India in the long run. The first of these is to prevent a new form of colonial competition among nations to grab the seabed. In spite of the U.N. General Assembly resolution declaring this area "the common heritage of mankind", the absence of a comprehensive international seabed regime will inevitably lead to such claims of sovereignty as competition for resources of the sea becomes intense. The meaning and implications of the "common heritage" declaration remain ambiguous. It

has been argued by some that the concept of "common heritage" is not a legal principle but merely a moral commitment. The absence of an agreed upon seabed regime will benefit only those who can stake a claim to an area of the seabed and back it by economic and military power. Therefore, the prevention of private claims of sovereignty should be a major consideration in formulating India's policy towards the seabed regime.

A second consideration for a seabed regime should be the extent to which it will permit India access to the technology of seabed mining and the results of scientific research on the seabed. Since the development of such technology is still in the early stages, is considered to be only moderately sophisticated, and is within the reach of many states, it may not be difficult for India to develop her own independent capability within a relatively short period of time with a modest effort. The decisionmakers, however, may choose not to make a long-run commitment of scarce capital resources in the absence of immediate direct benefits. Therefore, it will be advantageous from India's point of view to strive for an international regime which would facilitate transfer of technological know-how. But there should be no illusions that such a transfer will be forthcoming without a price.

A third consideration for India's policy should be to prevent exhaustion of seabed resources before she can develop her own capability to exploit them. Given the total tonnage of manganese nodules on the seabed, it may seem unlikely that all the nodules could be exhausted in the next few hundred years. But total tonnage is not the same as the quantity which can be economically exploited. Economic value of a deposit depends on many factors mentioned earlier, and only a small fraction of all nodules are economic reserves. For India, economic reserves are likely to be those that lie in the Indian Ocean. If these reserves are found to be exceptionally lucrative, the industrial nations may exploit them before India develops her capacity to do so. It will be uneconomical for her to exploit the seabed resources in the Pacific or Atlantic Oceans in the near future due to high costs of transportation. Fortunately, not much exploration has been conducted in the Indian Ocean so far, and the best known deposits of nodules are in the Pacific Ocean. It would be in India's interest to ensure that the international regime limit the area in which exploration and exploitation rights can be granted to a particular country thus assuring a share of the pie to every nation.

A fourth consideration for India's stand on the seabed regime should be the prevention of ecological damage to the oceans. Interpreted liberally, this implies that adequate attention should be paid to the conservation of other resources and uses of the seas when the manganese nodules are

exploited. This includes minimizing interference with fishing, transportation and the ecological balance of the seabed and ocean space as well as taking into account the effect of nodule exploitation on the future recovery of nodules. An international seabed regime could ensure and enforce strict environmental responsibility by requiring every seabed producer to deposit a certain sum in an environmental fund as security against potential pollution.

A fifth consideration would be to slow down the increasing gap between the developed and developing states by taxing the revenues derived from manganese nodule exploitation. While the original estimates of funds that would become available to an international authority were vastly overblown, the principle of returning a fair portion of profits derived from exploiting the "common heritage of mankind" to its less fortunate owners remains sound. These sums could be expended in any widely accepted purpose such as research for combating malnutrition and increasing the protein intake of diet from the sea, or the transfer of technology to broaden the economic base of the developing countries. However, it is not unlikely that this principle would merely reallocate and transfer the funds that would have reached the developing countries through foreign aid programs. With the current trend towards cartelization among the energy and rawmaterial rich nations of the Third World, the industrial nations may become less amenable to accept restrictions on the benefits they may derive from seabed mining.

A sixth consideration for India's policy, in keeping with her foreign policy in general, would be to minimize international conflict and tension by striving for the orderly exploitation of seabed resources. If economic gains from the sea are accompanied by conflicts for the possession of the most valuable deposits, the opening up of seabed resources may prove to be a disaster in disguise.

III. Policy Options for India

Given the salient features of seabed mining and India's policy objectives which have been described above, we can now consider the range of policy alternatives available to India and evaluate them in terms of her policy objectives and general political acceptability by the world community. The three alternatives considered here vary along the dimension of the degree of power given to the ISA: (1) prevent formation of an international agency and attempt to delay exploitation of seabed minerals, (2) establish an international office with evidentiary and recording but no regulatory functions, and (3) establish an international regulatory agency to control exploration and exploitation of the seabed minerals. Variations of the last alternative along different dimensions are considered in some detail.

Delay Establishment of an International Authority

The first alternative is to postpone exploitation of the seabed beyond national jurisdiction and to prevent establishment of an international seabed authority. An argument can be made for this position on the following lines. India, and developing countries in general, have little to gain from the exploitation of seabed resources in the immediate future. Exploitation of such resources would only lower the price of their exports and adversely affect their economies. A concurrent fear is that foreign capital which would have been invested in exploring and exploiting untapped land resources in developing countries would be diverted to seabed production. Since developing countries do not currently possess substantial amounts of capital or the technology necessary for seabed mining, their best hope is to cause a delay in seabed mining by industrial nations. A failure to conclude an agreement on an international seabed regime would cause enough uncertainty about control of resources in specific areas of the seabed to deter potential entrepreneurs from risking huge capital investments in seabed exploitation.

As we have pointed out earlier, India does have the potential and capability of directly benefitting from seabed resources in a not-too-distant future, and as such, the development of an international regime would not be contrary to her interests. Moreover, there is little chance that the developing countries can prevent exploitation of seabed resources by industrial nations by not agreeing to a seabed regime. As long as the technology and demand for mineral production exist, industrial states will assume production with or without an international agreement. The absence of an international agreement may not even cause any significant delay in the production timetable. To avoid conflicts among themselves, the small number of interested industrial nations may simply conclude a working understanding of mutual noninterference. Since manganese nodules are scattered in vast areas of the seabed, there may not be any immediate conflicts. However, in the long run, such agreements may well break down under the pressure of increased importance of resources and competition for the most favorable mining sites and cause serious international crises. *Ad hoc* arrangements will result in inefficient exploitation of seabed nodules which will penalize the late entrants in the field of nodule mining. Pollution and other environmental damages could wreak havoc with the ecology of the ocean without leaving any recourse available to the international community. There would be no way of preventing conflict of seabed mining with other conventional uses of the sea such as shipping, fishing or laying cables on the ocean floor. This policy option, therefore, will gain nothing for India and other developing countries. On the other hand, they will lose whatever leverage they could

otherwise apply through an international regime. We, therefore, do not consider this a preferred policy alternative.

An International Registry Office

A second alternative is to encourage establishment of an international registry office which would carry out only evidentiary and recording functions and will have no regulatory authority. An entrepreneur who wished to exploit the resources of the seabed beyond national jurisdiction would inform the international office to gain security of title and investment in a specific area of the seabed. It is posited by its advocates that such an arrangement will prevent conflicts and will require only a minimum of bureaucracy to administer it. As the powers given to an international agency increase, so do its administrative costs. In comparing alternative arrangements, it is relevant to consider the costs of administering an international agency and to subtract such costs from the projected benefits before evaluating each option.

The first consequence of such an arrangement is likely to be an ocean grab with states scrambling to claim a part of the seabed by simply registering with the ISA. Though such a system will provide adequate protection to the entrepreneur on a first-come-first-served basis, it is almost certain to result in overcapitalization and congestion.

From the point of view of India and other developing countries, this approach is close to allocating the seabed beyond national jurisdiction to the industrial nations. Though the initial allocation would be for a limited period of time, area, and solely for the purpose of exploiting specific minerals, it is not at all unlikely that such exclusive claims may, over time, mature into stronger claims of sovereignty over such areas if they prove to yield enough economic resources in the future.

The registry approach, therefore, has no advantage to India and is likely to be strongly opposed by most other nations. By allowing private entrepreneurs to exploit the seabed resources for private benefit over short periods of time, and without controlling the damage to environment and future exploitability of resources they may incur, this alternative is likely to be globally inefficient. It has no provision for any returns to mankind although presumably the resources that would be exploited are the common heritage of mankind. Its workability over an extended period of time is very much in doubt as pointed out earlier, and it can be ruled out as a viable alternative.

An International Regulatory Authority

A third policy alternative is the establishment of an international authority that would regulate exploration and exploitation of the seabed

resources in such a manner that the benefits of the seabed resources are equitably distributed among the people of the world. The nature of such an agency can be specified along four important dimensions: (1) the degree of control of output and, therefore, indirectly of prices, (2) the method of collection of rent or royalty, (3) the method of distribution of economic benefits, and (4) the control of the agency's policies. We shall consider each of these dimensions of international regulatory machinery in turn.

1. *Control of Output and Prices.* The international agency could be authorized to exercise varying degrees of control over production of minerals to prevent overproduction and economic dislocation in producing countries as a result of price declines. If the agency issues licenses to states and private parties and reserves the right to specify the amount they can produce from time to time, the economic attractiveness of such a license will be considerably reduced because of the uncertainty to entrepreneurs about returns on their investment. Two other means of controlling production would be (a) to issue exploitation licenses over an area judged appropriate to maintain a balance between land and sea production, and (b) to issue exploitation licenses for a specified amount of annual production consistent with the market and price stability. Both these methods will avoid the uncertainty of *ad hoc* production controls on the entrepreneurs but would discourage private exploration because the entrepreneurs would not be assured of receiving a license to exploit their discoveries. An effective control over sea-based production will, however, be accomplished.

Control of prices may not be so easy. Also, it has both desirable and undesirable aspects. Unless land-based production is completely eliminated, which is very unlikely in the foreseeable future for copper and manganese, the sea-based producer will compete in the market not only against other sea-based producers but also against the existing and new land-based producers. Unless sea-based production constitutes a sizable proportion of the world demand, any control that the agency can exercise over the prices through production will be very weak. Production controls to prevent a decrease in prices, therefore, will have to be global in nature as long as both land- and sea-based production remain economically feasible. An agreement on global production controls for tin has been reached and is in the making for petroleum. These controls, however, are motivated by the preservation of the interests of existing producers and not by broader considerations of efficiencies in international production. Whether the seabed authority should enter into global production control agreements designed to protect the interests of the existing producers is certain to be hotly debated and is unlikely to find favor with a majority of nations because such controls will tend to freeze the prices of controlled minerals for long periods and prevent the benefits of new technological developments

and resources from being passed on to the consumers all over the world in the form of lower prices. Perpetuating the control by existing producers of certain raw materials at the expense of the remaining international community is not a real possibility, nor is it in India's long-run interest. As we argue later in the paper, the damage to the economies of the existing producers should, however, be directly compensated.

2. *Collection of Rents and Royalties.* The international agency will be authorized to collect revenues in exchange for allocation of exclusive rights to exploit specified blocks of seabed. We shall discuss three different financial structures and modes of operation for the agency.

One possibility is that the international regime may exploit the seabed resources directly by buying equipment, hiring labor and technical expertise and marketing its products. The regime will have a monopoly in seabed production but not in the market where it will have to compete with the land-based producers. In a variation of this proposal, the ISA may give out contracts to private corporations for specific tasks of exploration, mining and marketing. But the ISA itself will act as the entrepreneur and therefore may make a profit or incur a loss after all the administrative expenses are paid for. There are serious problems with this approach. The difficulties of raising very large amounts of capital to the tune of U.S. \$ 180 million for each one million tons of dry nodules mined per year should not be minimized. Capital cannot be raised unless the contributors are assured of a reasonable return on their investment and unless they have a satisfactory degree of control over the operations of the agency. An international agency working as a monopoly producer of seabed minerals can hardly be expected to be a model of economic efficiency. Even if it can keep itself from red ink, it is unlikely to generate substantial surpluses for distribution to the economies damaged by seabed mining. Such surpluses will almost surely be absorbed by the international bureaucracy employed to run the agency as a business enterprise. It may be useful as a tactical device for a better bargaining position in the forthcoming Law of the Sea Conference. It may not be difficult for a similar proposal to muster strong support in the Law of the Sea Conference but such a paper majority will have little result in practice. There is little chance that this proposal will be supported or funded by the industrial nations. For all intents and purposes, it will lead to exploitation of the seabed by private agreements among the dissenting industrial powers while the rest of the international community is left whistling in the dark.

A second mode of operation would be to issue licenses to states or private parties for rights of exploration and exploitation of specified blocks of the seabed. The fee structure would have to provide a balance between

encouraging the development of the seabed by offering adequate financial incentives to the entrepreneurs on one hand and ensuring a fair return to the world community at large on the other. The fee structure could be a combination of (i) an area based rent for nonexclusive exploration and exclusive exploitation rights, (ii) a royalty based on the value or volume of production, and (iii) an income tax based on the profits of the operation. The last of the three forms is likely to be difficult to administer on an international scale. After determining the desirable amount of production and the seabed area needed for efficient production of this amount, the Agency could auction off leases on economically sized blocks of seabed. Such a procedure will ensure an economic rent to the Agency provided there is a sufficiently large number of noncolluding bidders for each block of the seabed. If only a half dozen companies are interested in seabed mining and the area to be leased is enough to provide each of them a profitable rate of output, they could collude with one another to keep the bid price unrealistically low. The Agency could, in such a situation, postpone leasing until the rent for the seabed increased sufficiently either through changes in the market structure for the minerals or through entry of additional bidders to the market.

A third proposal for collecting revenues is to impose some form of tax on the consuming countries which benefit from a drop in price at the expense of producing countries. Such an arrangement would be very cumbersome and expensive to administer. While producers of minerals are few in number, almost everybody is a consumer to some degree and such a global taxation system, even if it was agreed to, would be very impractical. Besides, the cause of a price drop in a market with many sources of supply is not always obvious. It seems unlikely that unambiguous rules for determining the cause of price changes can be framed to general satisfaction.

3. *Distribution of Economic Benefits.* The most important aspect of the agency would be to distribute the economic benefits from the seabed resources among the nations of the world. The wealth available for direct distribution by the agency will be the gross revenues less the costs of production which include the labor, administrative, capital and entrepreneurial charges. As a result of the substantial uncertainties associated with the future of seabed mining, it is difficult to arrive at reliable estimates of this amount. In the initial stages of seabed mining, the net revenues available for distribution would be negative until the production reaches the breakeven point. A second category of economic benefits resulting from seabed mining consists of increased opportunities for employment, engineering and industrial development and technological spillovers. These economic benefits are at least as important as the directly

distributed net revenues and will generally accrue to the industrial countries. The following discussion, however, is restricted to the distribution of whatever positive net revenues become available. Three forms of distribution, not necessarily exclusive of one another, are considered.

Assuming that the seabed minerals can be produced at least as cheaply as the land-based minerals, the first and the simplest method of distributing the wealth of the sea in the world is through lower prices. But each country's share will be directly proportional to her consumption of such minerals. Since rich industrial nations consume most of the minerals, the lion's share of the wealth of the seas will also go to them. This will only make the rich richer and will not be acceptable to the developing countries. Given the world demand for, and relative proportion in the seabed nodules of various metals, downward pressure on prices would be focussed mainly on cobalt, to a lesser extent on nickel, to a much smaller extent on manganese if manganese production proves economically feasible, and very unlikely on copper. As an importer of copper, nickel and cobalt and an exporter of manganese, India will benefit from a drop in price of the former three metals. The effect of manganese production on India will be negative. Many other exporters of minerals such as Zaire (cobalt), Gabon (manganese), and Indonesia (nickel) will also suffer from price declines.

A more equitable distribution of the wealth of the sea than can be accomplished by the price system will involve compensating those nations whose exports suffer as a result of production from the seabed. The principle of compensating for export losses has been widely recognized and will almost surely be incorporated into the agreement. There will, however, be some problems in determining the extent of compensation. The first problem concerns the estimation of export revenues lost due to competition from the sea. Since land-based producers will compete not only against one another, loss of exports may not be unambiguously determinable. In the absence of a dramatic rise in demand, one solution will be to assign a proportionate share of sea-based production to each land-based producer as the export loss. This will still leave the problem of new entrants to land-based production. Given that the loss of export revenues can be determined on an agreed basis, the second problem concerns the fractions of the export revenues which should be reimbursed to the exporting nations. It has been argued that only that part of the export value that is generated by the use of resources which cannot be put to alternative use in the economy of the exporting nation should be reimbursed because it represents the economic loss. On this basis, India would be entitled to compensation to generate employment for the workers rendered unemployed by reduction in manganese production. A third

issue associated with compensation is the form in which it is to be paid. While the receiving nations would like to get cash and be free to spend it as they wish, suggestions have been made that the compensation be specifically linked to the sectors of economy damaged by sea-based production, for example, the compensation received by India for the loss of manganese exports be reserved to generate employment for such workers as suggested above. Since the economies of many developing countries are dependent on the export of one raw material, the compensation could also aim at broadening and diversifying their economic base.

A third basis for the distribution of the wealth of the seabed would be to compensate the underconsuming nations of the world because most of the benefits of lower prices of the minerals produced from the seabed will accrue to the overconsuming nations. The Secretary General's report posits five criteria for such distribution: (1) Per capita benefits are inversely related to per capita gross domestic product (GDP). (2) Proceeds are divided into three equal blocks and each block is shared in proportion to each country's population in that group. The first block is shared by all countries, the second by those having per capita GDP under U.S. \$1,000 and the third by those having per capita GDP under U.S. \$150. (3) This is similar to (2) except that the proceeds are divided into five blocks to be shared by all countries, and those having per capita GDP under U.S. \$1,000, 500, 250, and 100, respectively. (4) An arbitrary level of per capita GDP (U.S. \$500) would be chosen, and countries with per capita GDP above this level would have their share reduced by a certain factor to be redistributed to the lower income countries. This would resemble a progressive world income tax. (5) This is similar to (4) with the provision that the benefits foregone by the higher income countries would be distributed at a progressive rate with decreasing levels of per capita GDP. The Secretary General's report provides a table of relative shares of all countries of the world based on each of the five criteria.

It would be in keeping with the General Assembly's resolutions and India's interests to draft the provisions of the international seabed authority in such a manner that if and when substantial resources of the sea do become available, they should be distributed equitably by some combination of the bases discussed above.

4. *Control of the Agency.* An equally important aspect of the ISA is the control over its policies. Whatever organizational structure is adopted, the executive control of the Agency must be vested in a body representative of the international community and should not be dominated by only those who have the capability to exploit the seabed minerals. According to the General Assembly resolution on the declaration of principles governing the seabed, the ownership of the seabed resources is vested in the

international community. Therefore, the Agency must derive its power and authority from all the countries. The Agency should not be set up primarily as a trade association of the seabed mining industry, governed and controlled by the industry and allowing representation to other countries only as an unavoidable nuisance.

IV. Summary

Increased world demand for mineral resources and recent technological developments have substantially increased the importance of the oceans as a source of supply. There is an urgent need to establish an international regime to regulate the exploitation of seabed resources beyond the limits of national jurisdiction. Manganese nodules are the most promising known resources of the seabed. Copper, nickel, cobalt and possibly manganese can be extracted from the nodules. India's manganese exports are likely to be hurt by production from the seabed but India may benefit from the lower prices of copper, nickel and cobalt. The formulation of India's policy towards a new seabed regime should consider not only these direct economic effects of seabed mining but also such factors as avoiding a world wide ocean grab, ecological damage to the environment and securing her fair share of the wealth of the seas. Several proposals have been made for the structure of an international regime by various nations. The examination of three major options—continuation of the *status quo*, establishment of a weak international agency with only registry functions and a strong international agency with regulatory authority—indicates that from India's perspective, the last form of organization is preferable over others.

The framing of international rules and regulations for the exploration and exploitation of seabed mineral resources cannot await the commencement of commercial operations. International institutions should precede and prevent rather than emerge as a consequence of conflicts, controversies and gross environmental and economic waste. Delineating a rational policy acquires added urgency in view of the Law of the Sea Conference. The formulation of India's policy towards an international seabed regime requires a careful and detailed scrutiny of the characteristics, implications and consequences of seabed mineral production in close correlation with India's interests and capabilities. We hope that this paper is a useful step in that direction.