

# UNCLOS AND THE REDISTRIBUTION OF OCEAN WEALTH

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# UNCLOS and the Redistribution of Ocean Wealth

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THE THIRD UNITED NATIONS Conference on the Law of the Sea (UNCLOS III) has marked time in 1981 as a result of the Reagan Administration's decision to review the convention text before proceeding with negotiations on the few but important outstanding issues. Prior to 20 January 1981 virtually all the 320 Articles and eight Annexes of the Draft Convention (Informal Text) produced at the ninth session in 1980 had received the support of all major delegations. Session ten in Spring 1981 was to have converted this draft into a final text for adoption by the Conference delegations in the fall. The United States' decision delays this process by at least one year.

The new administration will attempt to obtain a more satisfactory accommodation of U.S. interests than the Draft Convention provides. However, if improvements for the United States require concessions by other governments, those nations may no longer feel that they gain more from a convention than they would from continuation of the *status quo* or from unilateral actions. This would destroy the consensus on which the convention must build to be effective as international law. To avoid reducing the negotiations to a zero-sum game, with little hope for a successful conclusion, proposed changes in the convention text should result in greater benefits from ocean resources.

All governments should have a common interest in fostering the efficient exploitation of ocean resources since this generates more income for all nations to share. No reliable estimates of global ocean wealth exist but it can safely be assumed to be significant. The oceans could now produce products worth at least 200 billion dollars or 5 per cent of world

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income.<sup>1</sup> The current annual value of fisheries and hydrocarbon production is worth about 160 billion dollars. Deep seabed mining of manganese nodules might contribute an annual value of more than 10 billion dollars if not regulated. These three industries together with shipping represent a current potential value of about 200 billion dollars. Of this, perhaps one-tenth constitutes rents—the competitive advantage that the oceans hold over landbased production of foodstuffs, energy and minerals. The contribution of these industries, and in particular of hydrocarbons, will increase with time and new uses of the oceans will develop. Thus, inefficient use of ocean resources jeopardizes substantial values.

World national product is maximized by allowing the most efficient producers to produce the most valuable products wherever it is cheapest. The ideal regime would not favor landbased production of foodstuffs, energy or minerals over production from the oceans, or *vice versa*. Nor would it favor production in any particular area of the oceans over another area. Finally, it would discriminate between firms on grounds of efficiency rather than nationality. The Draft Convention frequently breaks these rules.

It is not surprising that efficiency has been sacrificed. Without effective mechanisms for redistributing income, each country will attempt to obtain a larger share of the resource for itself, even at the expense of some inefficiency. Since countries are not required to pay for an increase in their share, the UNCLOS III negotiations are characterized by the coastal states' attempts to enclose any ocean space that might have some future value. Exclusive ownership has become more attractive as growing world population and advances in marine technology have increased the value of these resources. Most coastal nations have attempted to appropriate them unilaterally. Also, population growth and technological advances have made the traditional regime of free and open access for all

<sup>1</sup> Pontecorvo and Mesznick (1974) estimated the gross national product of the world oceans to be 60 billion dollars. Their estimate was presented in an appendix without explanatory text and presumably refers to a year early in the 1970s. Shipping and "other surface uses" constitutes the largest item—40–50 billion dollars. This is twice the value of shipping services provided in 1974 as estimated in Wijkman (1980, p. 278 text and n. 14)—22–25 billion dollars. The value of ocean resources increased significantly with the quadrupling of oil prices in 1973. The output of offshore hydrocarbons currently is worth about 140 billion dollars per year and can be expected to increase steadily. Adams (1980, Table 4, p. 31) estimates the value of seabed production in twenty years to be 15.6 billion dollars in current prices, i.e. about 8 billion dollars in 1980 dollars. This value might have been realized in the eighties if seabed mining had not had to await conclusion of UNCLOS III. The value of fisheries is currently about 20 billion dollars, a value which would be larger under effective management schemes. Thus the potential current value of ocean commodities is at least 200 billion dollars. According to Pontecorvo *et al.* (1980, Table 6, p. 1005) the value of output from the U.S. ocean sector was 30.6 billion dollars in 1972 or 2.6 per cent of U.S. gross national product. Additional estimates for the U.S. are provided by Nathan (1971).

nations increasingly inefficient as ocean resources become more scarce, and this has been used as an additional argument for national enclosure. While this may result in more efficient production than open access, it is not always the most efficient outcome.

One might think that because the distributional outcome is a negotiated outcome it is generally acceptable. However, the large number of both countries and issues involved in the Conference negotiations has made effective bargaining extremely difficult and resulted in unexpected results (Tollison and Willett, 1976, pp. 97-100). Furthermore, some countries assign great importance to nonpecuniary benefits and others initially lacked sufficient information about the nature and location of ocean resources to protect their national interests (Cooper, 1979). Consequently, many countries have since had second thoughts about the distributional outcome which appears haphazard. The big winners are coastal, broad-margin states and landbased producers of nodule ores. Among these are some of the richest countries in the world. The biggest losers are non-coastal, developing countries which are net consumers of nodule ores. Among these are some of the world's poorest countries. This hardly conforms to the declared goal of the Conference to redistribute ocean income to the poorer countries.

This article considers how the regimes proposed for fisheries, offshore hydrocarbons, and the resources of the deep seabed will affect efficiency in production and will redistribute income between nations. The viewpoint is global rather than national, paying particular attention to the distribution of income between developed and developing countries. Each section discusses how the Draft Convention proposes to award jurisdiction over ocean resources to nations, and how those nations in turn are likely to award user rights to firms. These issues of resource use and resource ownership will determine how much income the oceans generate and how it is distributed among nations.

### I. THE FISHING REGIME

The world's annual catch of fish was worth about 20 billion dollars at the end of the seventies, constituting about one-half of one per cent of world income (Holt, 1978, p. 53) and about 15 per cent of world protein consumption. Ninety-nine per cent of the catch is harvested within 200 nautical miles of the coast and the remainder are highly migratory species caught on the high seas (Gulland, 1979, p. 36). The Draft Convention awards coastal states the exclusive rights to manage the world's major fishing stocks and priority rights to harvest them by creating an exclusive economic zone (EEZ) extending 200 nautical miles out from a country's coast. In this zone the coastal state is granted "sovereign rights for the purpose of exploring and exploiting, conserving and managing the

natural resources, whether living or non-living, of the sea-bed and sub-soil and the superadjacent waters and with regard to other activities for economic exploitation and exploration of the zone such as the production of energy from the water, current and winds . . ." (Article 56.1(a)).

Articles 69 and 70 in the Draft Convention allegedly modify the fishing rights of the coastal state. They allow landlocked states and countries with certain geographical characteristics deemed disadvantageous to harvest "an appropriate part of the surplus of the living resources of the exclusive economic zones of coastal states of the same subregion or region" (Article 69.1 and Article 70.1). They also obligate the coastal state to negotiate with developing landlocked and geographically disadvantaged states in the same region or subregion to establish "equitable arrangements" which would allow them to participate in the exploitation of the living resources of the coastal state's EEZ (Article 69.3 and Article 70.4) even when the coastal state has the capacity to harvest the whole allowable catch.

These concessions by the coastal states are, however, more apparent than real. The coastal state alone determines the size of the allowable catch and of its own harvesting capacity. It can determine unilaterally the size of the surplus it is required to share with landlocked states and those with specified geographical characteristics; it can set that surplus at zero, if it so desires. Furthermore, even though the coastal state may be obligated to allow developing landlocked and geographically disadvantaged countries to participate in harvesting the allowable catch in its EEZ, Article 62.4(a) allows the state to charge foreign fishing vessels a fee for this privilege. Thus, in spite of Articles 69 and 70, the coastal states will enjoy (or dissipate) all the rents from the world's major fishing grounds. The next section considers the size of these rents and how they are distributed.

#### *Income Distribution*

The rents from fishing grounds have been estimated to be worth between 2 and 4 billion dollars annually, i.e. up to one-fifth of the value of the total catch. This represents the excess of the value of the fish caught over the cost of the capital and labor needed to capture them *when the fishery is efficiently managed*. Rents are an unearned income provided by the bounty of nature and often dissipated by man through inefficient use of fishing vessels and fishermen as well as through overfishing of the stocks.

Cooper (1975, p. 363; 1977, p. 110) has estimated that these rents constituted 2.5 billion dollars annually in the mid-seventies. Crutchfield (1979, p. 270) estimated that the deadweight loss imposed by overfishing in the Northeast and Northwest Atlantic was 2 to 3 billion dollars in

1979. About 27 per cent of the world's major fish stocks in the mid-seventies was caught in this area (Gulland, 1979). These and other estimates indicate that rents from fishing grounds are substantial. Furthermore, the falling catch per unit of effort during the seventies suggests that they are rising. Under the traditional regime of open access to fishing grounds these rents are either enjoyed by fishermen or dissipated by them through overcapitalization of the fleet or congestion on the fishing grounds. The Draft Convention would redistribute income from long distance fishing fleets and other foreign fishermen to those states with long coasts bordering on rich fishing grounds. The richest fishing grounds, like the richest countries, are located in the temperate zones, and three-quarters of the world catch is taken from waters off the developed countries (see Table 1, Col. 1). Thus, developed countries will get roughly 3 billion of the 4 billion dollars of rents generated currently.

TABLE 1  
WORLD FISH CATCH DISTRIBUTED BY REGION AND VESSEL OF CAPTURE 1972

	Total catch		Catch by non-local fishermen		Catch by non-local fishermen from developed countries		Catch by non-local fishermen from developing countries	
	Million metric tons	% of total catch	Million metric tons	% of col. 1	Million metric tons	% of col. 1	Million metric tons	% of col. 1
Catch in developed country areas	41.1	73.3	11.1	27.0	11.1	27.0	0.0	0.0
Catch in developing country areas	15.0	26.7	5.2	34.7	4.1	27.3	1.1	7.3
Total	56.1	100.0	16.3	29.1	15.2	27.1	1.1	2.0

Note: 1972 represents the last year before unilateral extension of fishing limits started. Thereafter the geographical pattern of fishing activity changed, and part of the income redistribution discussed in the text has already occurred as a result of these unilateral measures.

Source: Compiled from R. Hennemuth (1979) and J. Gulland (1979).

Prior to the extension of fishing limits, non-local fishermen enjoyed (or dissipated) about one-quarter of the rents generated off developed countries' coasts. All these fishermen were from other developed countries (see cols. 2 and 3, Table 1). Thus, the Draft Convention would redistribute about 800m. dollars annually from developed long distance

fishing nations to developed coastal states.<sup>2</sup> About one-third of the catch in developing countries' waters is taken by non-local fishermen, and these are largely from developed countries. Some 400m. dollars, then, will be redistributed annually to developing coastal countries, of which 300m. would come from the fishermen of developed countries. These rough calculations assume that all fishing grounds are of equal productivity. It is probable, however, that the productivity and rents of fishing grounds bordering developed countries are greater than those near developing countries.

Thus a total of at least 1.2 billion dollars annually is to be redistributed to coastal states, and of this the developed countries would enjoy the major part. Developing coastal countries do gain somewhat at the expense of the developed. The major losers are long-distance fishing fleets and those fishermen who historically have fished in waters that now are declared "foreign".

Whether this redistribution of income is fair is a matter of opinion. Coastal countries claim ownership of the fishing stocks by right of proximity. Less fortunately located nations stress that this resource, too, should be part of the common heritage in which they have a share. Undeniably, the proposed treaty fails to compensate those fishing nations that lose historical rights, and favors currently rich coastal countries over poor ones, and coastal states over others. This is a surprising outcome of the negotiations since non-coastal states have a blocking vote.

### *Efficiency*

Coastal states often justify the awarding of property rights to themselves on the grounds that this is necessary to allow them to manage the fishery and prevent stock depletion which otherwise would threaten common property resources. Since many stocks were seriously depleted in the early seventies, this argument was generally accepted. However, coastal state jurisdiction is neither necessary nor sufficient for efficient management. It could be efficient only if the extension of fishing limits brought the fishing stock (and sometimes also its predators as well as the fish it preys

<sup>2</sup> Note that foreign fishermen can still enjoy some of these rents through a direct investment or joint venture with the coastal state. A foreign fishing interest, refused permission to fish in a coastal state's EEZ, can through a direct investment set up a local corporation as the legal owner of its vessels. In this case, the terms of vessel registration determine how the rents are split between the two parties. For instance, if the coastal state can charge foreign owned fishing corporations a discriminatory flag fee, it can extract some of the resource rents. If in addition, the coastal state requires that its flag vessels be built in the coastal state and manned by coastal state residents, then its factors of production can capture remaining rents. If in addition, the coastal state requires that its flag vessels land their catch in its ports, then any transportation or processing advantage that foreign fishing fleets enjoyed is eliminated. On the other hand, foreign fishermen will be able to enjoy the same rents as before, if the coastal state merely supplies a flag of convenience at a nominal fee while real factors of production used in fishing are unchanged. In the case of joint ventures, the division of rents between the coastal state and the foreign fishing interests depends on the terms of the agreement.

upon) entirely within its jurisdiction. In practice, enclosure of the whole ecosystem will occur only occasionally.<sup>3</sup> Many stocks that migrate along the coast remain transboundary resources even after the extension of fishing limits to 200 nautical miles. With some exceptions (Icelandic cod is notable) major fishing stocks will remain common property resources, albeit common to fewer states than before. The crucial question is whether extension of fishing limits will reduce the number of co-owners of fishing stocks sufficiently to create incentives for voluntary cooperation in managing the stocks. If not, coastal state management will be inefficient: partial management is not necessarily better than no management. A supranational management regime must be given coercive powers in the many cases where too many co-owners share the stock for voluntary cooperation to work. Nevertheless, the Law of the Sea Conference has awarded management rights to coastal states without setting up a mechanism to ensure that management will be effective.<sup>4</sup>

In addition to imperfectly managing stocks, the provisions of the treaty will foster inefficient fishing activities because the treaty does not require that entry to fishing grounds be granted on a non-discriminatory basis. On the contrary, it sanctions use by the coastal state of tariffs or quotas on international trade in fishing rights. Such trade restrictions impose economic losses on society.

It would be unwise to underestimate the frequency of protection and its costs. Programs to control harvesting are unpopular with domestic fishermen, who view extended fishing limits as a means to protect fishermen rather than fishing stocks. In many of the 80 countries which already claim 200 mile fishing limits, domestic fishermen have replaced foreign fishermen. Domestic political opposition as well as the inability to cooperate with other governments sharing the stock has led many governments to postpone introduction of effective controls on total catch. Discriminatory access will create inefficiency in the fishing industry and raise costs because it forces part of the world fishing fleet to move to new waters and to convert to new types of fishing.<sup>5</sup> This leads to higher

<sup>3</sup> Traditionally, management plans have been based on managing a single species at a time. The necessity of managing the whole ecosystem has been increasingly recognized. For instance, the Convention on the Conservation of the Living Marine Resources of the Antarctic adopted by the Antarctic Treaty Nations in December 1980 adopts an ecosystem management approach. For a description of the problems involved in managing even relatively simple ecosystems see May *et al.* (1979) and Donaldson and Pontecorvo (1980).

<sup>4</sup> A different conclusion is drawn by Eckert (1979) who argues that national enclosure will prove more efficient than the current situation and is also preferable to international management.

<sup>5</sup> Note that discriminatory access is not itself sufficient to cause inefficiency. According to the Heckscher-Ohlin theorem restricting international trade in fishing rights will lead to international factor movements, which will result in factor price equalization if transfer costs are zero. Consequently, restrictions on factor movements or positive transport costs together with discriminatory access cause inefficiency. For instance, coastal state requirements that vessels be locally built and manned prevent the sale of the vessel from foreign to local fishing interests in response to discriminatory access. Should such sales occur, efficiency would be unaffected although the distribution of income is obviously affected.



priced fish products, to which consumers react by substituting landbased foods for seafoods. This reduces the ocean's contribution to solving the world's nutritional problems.

## II. THE REGIME FOR OFFSHORE OIL AND GAS

Offshore hydrocarbons may be the most valuable ocean resource. Today 20 per cent of oil production, worth about 140 billion dollars, comes from offshore (Driver *et al.*, p. 2), entirely from the continental shelf. Production platforms currently operate at 350 meters water depths, and production and transportation technology to exploit reserves in deeper and more distant waters is developing rapidly (Mason, 1981). Three-eighths of proved reserves lie offshore (Exxon, p. 5), and half of the hydrocarbon reserves that remain to be discovered are estimated to be there (Klemme, 1977). Consequently, 40 per cent of world hydrocarbon production may come from offshore sources by the year 2000.

The right to these resources currently is regulated by the Geneva Convention on the Continental Shelf of 1958. According to this a coastal state has the right to exploit the resources of its adjacent continental shelf out to the 200 meter isobath or as far out as the water depth permits exploitation. It therefore follows that this exploitability criterion allows national jurisdiction to move outward as technology improves. One of the tasks of UNCLOS III was to provide a more definite border between national and international jurisdiction on the seafloor. Clearly, where this line is drawn determines who gets potentially valuable offshore hydrocarbon reserves.

### *The Borderline*

In 1967 Arvid Pardo, Malta's Ambassador to the United Nations, proposed that the seabed and the ocean floor underlying the seas "beyond the limits of *present* national jurisdiction" (my italics) be subject to an international Authority. The General Assembly's "common heritage" resolution in 1970 incorporated Ambassador Pardo's proposal but deleted the word "present" from his phrase. Thereafter, coastal states have vied with each other to propose formulae to extend seaward their jurisdiction over the resources of the continental margin before the Authority is established. As a result the Draft Convention embodies a definition that awards coastal states complete jurisdiction over seabed resources to at least 200 nautical miles. When a country's continental shelf extends further than 200 nautical miles, it is awarded resource jurisdiction to "the outer edge of the continental margin" but it is also required to share with the international community the revenues obtained from resource exploitation on its margin beyond 200 miles. The Draft Convention provides a complex set of alternative definitions of the

outer edge of the continental shelf (Article 76). In short, a country can claim resource jurisdiction *either* out to 60 miles past the foot of the continental slope *or* to a point where the depth of the sediments is one per cent of the distance back to the foot of the slope<sup>6</sup> (the Irish formula); in either case the maximum extension is *either* 350 nautical miles from the country's baseline *or* 100 nautical miles beyond the 2,500 meter isobath. Prominent "broad-margin" countries according to the Irish formula are the Argentine, Brazil, Sri Lanka, Australia, Canada and United States. In this area the coastal state has resource rights and the International Seabed Authority limited taxation rights. For this reason it is sometimes called a mixed rights zone.

According to Article 82 of the Draft Convention, the Authority would levy a wellhead tax of one per cent of the value of production in the fifth year of production, rate to rise by one per cent per year until it reaches seven per cent in the twelfth year. The resulting revenues are to be distributed primarily to the developing countries. How large those revenues will be depends only in part on the distribution of offshore hydrocarbon resources.

#### *Income Distribution*

The distributional effects of this borderline and the proposed tax schedule is determined by the distribution of prime reservoirs. Prime reservoirs are those which, because of characteristics such as size, water depth, distance from land, water surface conditions, etc., are the cheapest to exploit. Unfortunately, we can present only statistics on the distribution of oil and gas reserves in general. This gives a very imperfect picture of the distribution of offshore hydrocarbon wealth.<sup>7</sup>

The total potentially recoverable oil offshore in the world has been estimated by Frezon (1974) to lie between 733 and 7,068 billion barrels. The uncertainty represented by this wide range is significant. At 30 dollars a barrel this represents a production value of between 22 and 212 trillion dollars. According to the National Petroleum Council (1975), between 5 and 20 per cent of world offshore oil lies beyond the 200 nautical mile limit, of which at most 2 per cent is under the abyssal plain (see also Emery, 1977 and 1979; Hedberg *et al.*, 1979). Combining the Frezon and

<sup>6</sup> It is hardly a coincidence that the probability of finding commercially exploitable deposits is, *inter alia*, a positive function of sediment thickness and an inverse function of distance from shore.

<sup>7</sup> Hedberg's (1976, p. 1013) warning is probably still valid. "Unfortunately there is no reliable answer to the demand for quantitative estimates of the magnitude of petroleum resources in unknown and undrilled areas such as those beneath the deep oceans. Many persons have yielded to the pleas of the public, governments, or the United Nations and have come out with figures. This is perhaps good, because there is a variety in these estimates which tells its own story and because, taken as a whole and in application to large enough regions, such estimates probably do give a worthwhile order of magnitude answer. However, the truth is that the estimators do not know, nor does anyone know before drilling."

NPC estimates suggests that the ultimately recoverable offshore oil which would be subject to revenue sharing is in the range of 36 to 1,272 billion barrels. To reduce this tremendous range of uncertainty, the author has taken an average of the maximin and minimax estimates, which locates about 250 billion barrels in the mixed rights zone.<sup>8</sup>

Assuming that this reserve is recovered to the last drop, that the annual production volume is constant over the lifetime of the well, and that the wellhead tax does not make production unprofitable, this estimate gives a total tax revenue of 315 billion dollars from oil reserves in the mixed rights zone. Assuming that these reserves are exploited over a period of alternatively 50 or 100 years, the International Seabed Authority would receive an annual revenue of 6.3 or 3.1 billion dollars respectively.<sup>9</sup> This is a significant amount, and although the estimate contains a wide range of uncertainty, it is not based on any extreme assumptions. Large amounts of money appear to be available for distribution to the developing countries through offshore oil production.

Several factors tend to reduce this amount, however. First, developing countries which are net importers of hydrocarbons do not have to pay the wellhead tax. This would exempt potential offshore producers such as Argentina, Sri Lanka, India and Malagasy. No logical justification for this exemption can be found on grounds of equity.

Second, the tax rate may be high enough to discourage production in the mixed rights zone for the foreseeable future. These deposits are in deep waters far off the coasts and consequently will be the last to be exploited. Thus, wellhead tax revenues available for distribution to the developing countries may materialize only in the distant future, if at all. However, if the Conference breaks down it is certain that revenue will not materialize. The 1958 Convention on the Continental Shelf allows coastal states to extend their jurisdiction seaward as drilling technology improves. As the North Sea has been enclosed by its coastal states, so may the oceans be divided up among the coastal states.

### *Efficiency*

Taxation of offshore oil distorts production least if it is done through competitive bidding at auctions for rights to explore and exploit leases (Logue *et al.*, 1975). Ideally this can extract the natural resource rents generated by offshore reserves. However, if the commercial value of leases is highly uncertain, the risk of failing to find exploitable reserves will reduce bids correspondingly. This risk is a real cost to the firm and to society and can be measured by the ratio of dry holes to total wells

<sup>8</sup> I.e.  $\frac{1}{2} (733 \text{ b.b.} \times 0.18 + 7068 \text{ b.b.} \times 0.05) = 243$  billion barrels.

<sup>9</sup>  $250 \text{ b.b.} \times \$30 = \$7,500 \text{ bill.}; \$7,500 \text{ bill.} \times 4.2\% = \$315 \text{ bill.}$  This gives \$6.3 billion per year if exploited over 50 years. For comparison, the U.S. government received 18.7 billion dollars for auctioning offshore leases during the decade ending in 1978 (Exxon, 1980, p 4).

drilled. This cost, too, should be minimized. When oil companies carry this risk alone, they will be more reluctant to explore for oil than if the risk were shared with the government through the taxation system. For instance, taxing production or corporate profits shifts some of the risk to the government, since taxes are paid only in the event oil is produced or produced at a profit, respectively. This risk sharing results in more exploration than would occur under bonus bidding and subsidized exploration of domestic oil. Furthermore, taxing corporate profits is less efficient since it captures only part of the natural resource rents, while taxing production at the wellhead as proposed by the Draft Convention is even less efficient because it leads to less production.

If risks are much greater in the mixed rights zone, as is reasonable to assume, and if areas of national jurisdiction employ a method of bonus bidding or competitive auctions, the wellhead tax will encourage more exploration activity in the mixed rights zone than is socially desirable from a global viewpoint. A wellhead tax is also inefficient because it reduces *ultimate recovery*; in the extreme case, the tax may be prohibitive. While the proposed annual rate of  $4\frac{1}{2}$  per cent averaged over 20 years may seem moderate compared with current rates of  $16\frac{2}{3}$  per cent on oil in U.S. waters, the rate is applied to a much smaller profit margin. The costs of exploration, production and transportation in deep and distant waters are not comparable with conditions in the Gulf of Mexico or even the North Sea. Because the wells in the mixed rights zone are marginal they may be extremely sensitive to even a small wellhead tax.

An additional inefficiency, finally, is caused by the time profile of the proposed tax. If it is possible to shift production to years with low tax rates in order to reduce the total tax burden on a well, production will be conducted at too rapid a rate for society. Some oil experts claim that this is not possible on a significant scale. However, increasing the tax rate during the first twelve years and thereby with the well's production volume will make it commercially profitable to leave some oil in the ground, oil that would have been recovered if the tax rate were constant over time. More oil would be extracted from a well if the wellhead tax falls over time.

In summary, compared with a system of lease auctions, the proposed wellhead tax will result in too much exploration in the mixed rights zone relative to areas where there is competitive bidding for leases; in production from fewer wells given the level of exploration; and, finally, in less oil pumped from the well when production in fact occurs.

### III. THE REGIME FOR THE DEEP SEABED

Manganese nodules, containing, *inter alia*, nickel, copper, cobalt and manganese, were long believed to be the major resource of the deep

seabed. The most controversial task of the Conference has been to design an institution to regulate their exploitation "for the benefit of mankind as a whole, . . . and taking into particular consideration the interests and need of the developing countries, . . ." (Article 140). Paradoxically, the regime proposed by the Draft Convention will harm the world community as a whole, by fostering inefficient production, and most developing countries by reducing their real income. Nevertheless, a majority of countries supports this regime because it provides non-pecuniary benefits and establishes a precedent in their struggle for a new international economic order. We shall first briefly characterize this regime.

Negotiations over the deep seabed regime arrayed developing countries in a cohesive group against most developed market economies, and each side offered proposals reflecting its dominant economic and ideological interests. The developing countries, emphasizing the need to plan production centrally and to modify the free market distribution of income, wished to establish an International Seabed Authority with extensive powers to regulate seabed mining. In their view, the Authority should have a monopoly on seabed mining. Production would be assigned to an Enterprise governed by an Assembly in which each country would have one vote. The Enterprise could cooperate with land-based mineral producers and thereby control total production and prices. If the Council decided to charge monopoly prices, it would maximize benefits to producers rather than maximize consumers' welfare and the rents extracted from the oceans.

Developed countries, on the other hand, believing in the allocative efficiency of the market economy and free enterprise, wished to limit the powers of the Authority. In their view, it should only register claims to mine sites and, if claims competed, the Authority should auction the site to the highest bidder. Competitive bidding would ensure that the most efficient firms would mine the seabed and also that the Authority would maximize both the welfare of consumers as a group and ocean rents.

A compromise between these opposite views emerged during the fifth session in the form of the "parallel system", by which national firms, private and public, may mine the seabed alongside the Authority's Enterprise. An applicant for mining rights must prospect and delineate two mine sites: upon granting mining rights the Authority keeps one of the sites for its Enterprise or assigns it to a developing country (Annex II, Article 8). This system, reminiscent of the sharing of a cake by children ("You divide, I'll decide"), provides the Enterprise and the developing countries at no cost to them with as many prime mine sites as the national firms have. Hence the designation "parallel system" since half the volume of seabed production potentially can come from the Enterprise.

Acquisition of prime sites alone is not sufficient for successful

commercial production by the Enterprise or by developing countries. They must also acquire mining technology, expertise and risk capital; the conditions for this acquisition remain the subject of negotiation. Likewise, only tenuous agreement exists on the principles by which the Authority will award mine sites to applicants and the closely related question of control over the volume of seabed production. Furthermore, the powers of the Authority to tax both national firms and the Enterprise as well as the question of who controls the Authority and thereby ultimately the Enterprise remains to be settled. Dissatisfaction with these issues and a basic ideological objection to the majority opinion led to the Reagan Administration's decision to review the Draft Convention before proceeding with further negotiations.

Thus, even though the principle of the parallel system has been accepted, no consensus exists on the practical details of technology transfer, capital subscription, allocation of mine sites and production control, taxation powers and voting rights. How these issues ultimately are solved will influence the efficiency of mineral production, the international distribution of income and the economic power of primary producers in commodity markets.

#### *Income distribution*

Under competitive conditions unregulated seabed mining would lead to a fall in the prices of nickel, copper and especially cobalt, or prevent a rise that would otherwise occur. At present, most commercial plans do not include recovery of manganese. This price reduction would transfer income from the owners of competing landbased production of these ores and their host governments to the consumers of the ores. Current production is concentrated in a handful of countries, both developed and developing, while all countries consume these ores although the developed countries consume the greater part. Thus, the prospect of seabed mining primarily pits landbased producers against consumer nations. However, developing consumer countries have supported the landbased producers in the Group of 77 and this has transformed the issue into a negotiation between the developed and the developing countries. This section presents a calculation of how unregulated seabed mining might redistribute income between these two groups of countries and considers how the Draft Convention proposes to prevent or limit this free market redistribution.

Adams (1980) estimates the growth of demand for the four nodular ores over the next twenty-five years and the growth of supply from land-based sources in the developed and in the developing countries and predicts their volume and prices in the year 2000. He then assumes that 19 seabed operations of 3m. tons each will be in operation in the year 2000 if no production limits are imposed, and calculates how this will

affect prices and volume of landbased production. Using his projections the present author has estimated how unregulated seabed mining would affect the developed and the developing countries as groups in the year 2000 (Wijkman, 1981). The results are summarized in Table 2.

TABLE 2  
DISTRIBUTION OF ESTIMATED GAINS AND LOSSES IN THE YEAR 2000 FROM SEABED  
MINING (MILLION 1980 DOLLARS)

	<i>Total</i>	<i>Developed Market Economies</i>	<i>Developing Market Economies</i>	<i>Socialist Economies</i>
Change in consumer surplus	+6,000.0	+5,400.0	+ 600.0	±0
Change in producer surplus	-5,300.0	-3,200.0	-2,100.0	±0
Net change	+ 700.0	+2,200.0	-1,500.0	±0

Assumptions: Price and volume projections with and without seabed mining are from F. G. Adams (1980). He assumes that 19 seabed mining operations of 3m. tons annual capacity each are in full operation in the year 2000. The present author further assumes that the developed market economies consume 90 per cent and the developing market economies 10 per cent of the market economies production in 2000; that the host governments capture half of producers' surplus through corporate profit taxes and royalties levied on landbased production in developing countries; and that one out of every three holders of stock in developing countries' mines resides in developed countries. The estimates have been rounded to avoid giving a false impression of precision.

The main conclusions of this table are the following. The annual net gain to the world from seabed mining is small, less than 1 billion dollars of 1980 value, but the transfer from producer interests to consumers is significant, about 5 billion (see Col. 1). The developed market economies as a group gain more as consumers than they lose as producers, reaping an annual net gain of over 2 billion dollars (Col. 2). The converse is true for the developing market economies which lose on balance one and a half billion dollars per year (Col. 3). Even if all the rents or taxes collected from seabed production were distributed to developing countries, they probably would not benefit on balance from seabed mining.

Long-term projections are necessarily uncertain.<sup>10</sup> Nevertheless this estimate illustrates that seabed mining poses a major distributional problem: significant amounts of income are transferred from landbased producers, some of them poor countries, to consumer nations, most of them rich countries. The landbased producers, both developed and

<sup>10</sup> The main uncertainty in the calculation concerns the size of the cost advantage seabed mining has over landbased production. Adams' assumption of 19 seabed mining plants in operation in twenty years is probably a conservative one. In the absence of international regulations, more may be in operation, and the net social gain and the redistribution from developing to developed countries will be correspondingly greater.

developing, advocated that the Conference impose limits on the volume of seabed production to mitigate their loss of income. The developing consumer nations have supported this position through the bloc vote of the Group of 77 although it is not in their short-run economic self-interest. Production limitation early became a cornerstone of the seabed regime, and succeeding sessions tightened the limitations so they increasingly came to favor producer interests.

Limiting production from the seabed reduces the harm inflicted on landbased producers, but it reduces the benefits enjoyed by consumers by a larger amount. The production controls proposed by the Draft Convention can be estimated to reduce the share of seabed production to about 25 per cent of total production in the year 2000, which is about one-third of what it might be with unregulated mining (Levy, 1979). This would prevent the realization of a world gain of about one-half billion dollars per year and also prevent a transfer of about four billion dollars from landbased producers to consumers.

While the landbased producers have an obvious self-interest in preventing competition from seabed production from inflicting losses on their firms and residents, production limitation is an inefficient way to do this. A deadweight loss is imposed on the world economy; it primarily benefits landbased producers in a handful of developed and developing countries alike (Australia, Canada, Chile, Peru, Philippines, South Africa, United States, U.S.S.R., Zaïre, and Zambia). The costs are paid for in the form of higher prices by consumers in all countries—poor as well as rich. A more efficient way to compensate landbased producers would be direct payments to them in proportion to the rents and tax revenues they lose and to finance these by contributions from consuming countries. Compensation payments, controversial as a principle, have not been seriously considered at the Conference.

### *Efficiency*

Efficiency in the production of manganese, nickel, copper and cobalt requires that the proposed seabed regime not favor landbased production of these ores over seabed mining, or *vice versa*, and that it not favor one branch of the parallel system of seabed mining over the other. However, the characteristic feature of the regime proposed by the Draft Convention is protection of landbased production from seabed mining if the seabed operation should prove cheaper, and subsidization of seabed mining by the Enterprise and to a lesser extent by developing countries. The unproven nature of seabed mining technology makes quantitative estimates of the magnitude of this inefficiency impossible. This section therefore simply indicates some elements of the Convention which may reduce allocative efficiency by distorting competition on the one hand



between landbased and seabed mining, and on the other between the parallel branches of seabed mining.

The production limitation system discussed in the preceding section is the primary cause of misallocating resources between seabed and land-based mining. A second cause is the structure of the proposed tax system. The Draft Convention presents a set of tax rates listed in Table 3.

TABLE 3  
CHAIRMAN KOH'S PROPOSAL AT RESUMED EIGHTH SESSION (1979)  
(Royalty and Profit Sharing Alternative)

	<i>Period 1</i>	<i>Period 2</i>
Royalty on gross proceeds	2%	4%
Tax on net proceeds attributable to mining: <sup>*</sup>		
when annual return on investment is 0-9.9%	35.0%	40%
when annual return on investment is 10-19.9%	42.5%	50%
when annual return on investment is 20% or more	50.0%	70%

Period 2 begins when the contractor has recovered his development cost plus 10 per cent.

<sup>\*</sup> Net proceeds due to mining the nodules are net of transportation and processing costs and calculated by a special formula. They will be at least 25 per cent of gross proceeds.

The tax rate on net proceeds moves into a higher column when a firm has recovered its investment costs. Furthermore, within each column, the tax rate is progressive, rising with the annual rate of return on capital invested. The strongly progressive nature of this tax structure is designed to transfer "excess profits" in seabed mining from national firms to the International Seabed Authority.

The ambition to regulate the return on investments utilizing a common heritage resource is understandable. Unfortunately, it also affects firms' willingness to assume entrepreneurial risks. Seabed mining is a high risk industry: existing estimates of the return on seabed mining vary greatly. Some ventures may make large profits while others take large losses. Firms considering investments in seabed mining face this prospect until the technology is commercially tested. A taxation system that allows the International Seabed Authority to share in higher than normal profits without having to share in losses, reduces firms' expected after-tax return from investments in seabed mining. Since landbased production is not subject to a similar system of progressive taxation, this would lead to an underinvestment in seabed mining relative to land-based production of nodule ores. In effect, national firms are regulated like public utilities to ensure that they do not earn monopoly profits, but lack the legal concession of a monopoly position to guarantee that they can recover their costs.

Preferential treatment for the Enterprise relative to national seabed

mining firms is provided by several provisions of the Draft Convention. This distorts competitive conditions and reduces the efficiency of the seabed mining industry as a whole, thereby providing an additional favor for landbased producers. The major subsidies are the following:

1. *Prospecting subsidy.* Receiving mine sites free of charge gives the Enterprise a competitive advantage over national firms which must expend prospecting costs estimated at 16.4m. dollars per site by the MIT study (Nyhart *et al.*, 1978, p. ES3) and at 69.2m. dollars by the Aachen/Frankfurt study (Diederich *et al.*, 1979, p. 10).

2. *Interest rate subsidies.* The Enterprise will receive the risk capital necessary for one seabed mining operation (about 1½ billion dollars currently) in the form of interest-free loans and loan guarantees in equal parts. Given an interest cost of 16 per cent on the first half, and an interest savings of four percentage units on the other half, this subsidy would be worth 150m. dollars per year—a significant competitive advantage. The loans and the interest rate guarantees will be supplied by states party to the Law of the Sea Convention in accordance with the scales for national contributions to the United Nations. This cost will burden the developed nations' taxpayers, not their mining firms. Consequently, this funding arrangement will have insignificant distortive effects.

3. *Technology Transfer.* Technology is to be transferred to the Enterprise on "fair and reasonable" commercial terms (Annex II, Article 5.3a). However, commercial terms are impossible to establish for mandatory transactions. Consequently, if this provision is effective it will transfer technology on concessionary terms. If it is ineffective, no transfer will occur that would not have occurred anyway. Using the MIT and the Aachen/Frankfurt study, one can estimate that private firms will have invested 250m. or 500m. dollars respectively in research and development of seabed mining technology. Part of this amount may be transferred on concessionary terms to the Enterprise. National firms are also obliged to transfer technology to developing countries which have received a mine site from the Enterprise.

4. *Tax breaks.* It was originally proposed that the Enterprise not be subject to any taxation. This would significantly distort competition. Instead the Draft Convention proposes that the Authority tax the Enterprise in the same manner as it taxes national firms. The Enterprise can negotiate for exemption from taxation by the host state where its facilities are located. If nodule processing is done on land rather than on ocean floating platforms in international waters, the Enterprise could obtain a competitive edge over national firms unable to obtain similar professional treatment (Annex IV, Art. 13.5).

Control of the Authority and thereby the Enterprise remains the most controversial issue of the seabed mining regime. As long as the

governing body has some discretionary power, distribution of voting rights between countries is a crucial question. The developing countries originally wanted each country to have the same voting power in the Council. This would put the developed countries in the minority, and consequently they wanted voting power to reflect the degree of involvement by countries in seabed mining and in the consumption of nodule ores. The proposal embodied in the Draft Convention (see Appendix) represents a balancing of these contradictory views. It has been rejected by the Reagan administration.

Negotiating the seabed mining regime involves principles which have been bitterly disputed in the North-South Dialogue: should resources be allocated by markets or by bureaucrats; is it possible to transfer technology effectively by fiat; what role do profits play for entrepreneurial risk-taking; can developing countries increase their economic power by instituting international commodity cartels and establishing economic democracy as a global decision-making principle. The value of the deep seabed regime in setting a precedent in these issues has dwarfed more mundane matters such as the efficiency of production and the distribution of seabed income between developed and developing nations. Transformed into a battleground for the new international economic order, the deep seabed may wind up with a regime that makes seabed mining a boondoggle for international bureaucrats rather than a boon for mankind.

#### CONCLUSION

The designing of a management regime for ocean resources that is both efficient and fair is a difficult task. Nevertheless, the potential economic value of ocean resources suggests that it is well worth the effort. The provisions of the Draft Convention do not ensure that ocean values will be fully realized or fairly distributed. Under the regimes proposed for fisheries, hydrocarbons and seabed mining, the most efficient firms will not necessarily be allowed to exploit the resources and the most economic resources will not necessarily be exploited first. As in domestic politics where considerations of efficiency are often sacrificed to achieve greater equity, the negotiations at UNCLOS III have been constrained by considerations of political feasibility. However, the resource regimes of the Draft Convention allow inefficient use of resources without redistributing income from the world's richer to its poorer countries.

What can be done in this situation? Attempts to renegotiate the treaty risk the unravelling of the package of compromises so tediously put together during eight years of negotiations. Governments satisfied by the Draft Convention try to convince others that the Informal Text is final and that, except for minor items in the seabed portion, the malcontents

must take it as is or leave it. The combined forces of inertia and exhaustion may well prove this to be correct. The key question therefore will be whether there is sufficient scope for substantive changes in the seabed mining regime. In this respect, one conclusion seems safe. Given the large nonpecuniary values that seabed mining represents for many governments and the potentially large redistributions of income caused by mining, a more efficient regime presupposes that the richer consumer countries compensate the landbased producers in addition to allowing seabed rents to go primarily to developing countries. They have been reluctant to do this so far, perhaps because they fear that implementing the principle of compensation would set a precedent for other resources, in particular those which are not common resources. But if the richest countries combine their pursuit of greater efficiency with willingness to compensate those who suffer from more efficient use of the commons and temper it with understanding for the demands by the poorest countries, UNCLOS III may yet produce a generally acceptable comprehensive treaty.

#### APPENDIX

##### *The Governing Bodies of the International Seabed Authority*

The parties have agreed to create a bicameral system on the model of the United Nations. There will be an Assembly in which each state party to the Convention has one vote and a Council consisting of 36 members elected for 4-year terms by the Assembly. Eighteen of the council members represent geographical areas and 18 represent "special interests" (Article 161:1). Table 4 presents the number of members representing each of the four special interest categories and the five geographical areas.

The representatives of developed market economies pointed out that this structure of representation would leave them with perhaps 7 to 9 votes, as indicated in Table 4. If decisions were taken by a three-quarters majority, 10 votes would be required to block a decision; this would ensure that the landbased producers and the developing countries together could control the Council and thereby the application of the seabed mining regime as defined in Convention articles. This was unacceptable to the developed market economies and in particular to the United States, which as part of the geographical group "Western Europe and Others" is not assured of representation on the Council. Control of the Council by the landbased producers and the Group of 77 was especially objectionable to the countries with seabed mining capability, if the Council were to be the body determining allocation of mine sites among applicants.

When attempts to change this basic structure of representation were unsuccessful the developed countries attempted instead to change the voting rules by which the Council would make decisions. They requested that a smaller number of votes be allowed to block any decision, but the Group of 77 found the concept of a blocking vote objectionable in principle. The Draft Convention resolves this conflict in the following manner. Decisions are divided into four categories, each requiring different voting procedures (Article 161:7). Questions of procedure are decided by a majority of the members present and voting; questions of substance are divided into three groups requiring a two-thirds and three-fourths majority of those members present and voting and a consensus, i.e. the absence of any formal objection, respectively. A special procedure is established to deal with allocation of mine sites to applicants.

TABLE 4  
PROPOSED COMPOSITION OF THE COUNCIL OF THE INTERNATIONAL SEABED AUTHORITY  
(DRAFT CONVENTION)  
THIRTY-SIX MEMBERS ARE ELECTED FOR FOUR YEARS BY THE ASSEMBLY TO REPRESENT  
GEOGRAPHICAL AREAS (18) AND SPECIAL INTERESTS (18)

<i>No. of Members</i>	<i>Interest Categories</i>	<i>Probable No. of Votes For Consumer Interests</i>
4	Representing seabed mining nations including at least one from Eastern (Socialist) Europe	3
4	Representing major consumer or net importer nations—including at least one from Eastern (Socialist) Europe	3
4	Representing major net exports including at least one from Eastern (Socialist) Europe	
6	Representing developing countries, with special interests, i.e. those with large populations, geographical disadvantages, major importers of seabed minerals, and least developed countries	(2)
18	Representing 5 geographical areas—Africa; Asia; Eastern (Socialist) Europe; Latin America; Western Europe and Others. At least one member representing each area; the remainder distributed to give "equitable" geographical "distribution of seats in the Council as a whole".	1
36		9

Note: Decisions by three-quarters majority would require 27 votes, meaning that consumer interests are unlikely to have the 10 votes required to block a decision.

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