

Oceanus

Volume XVII, Summer 1973

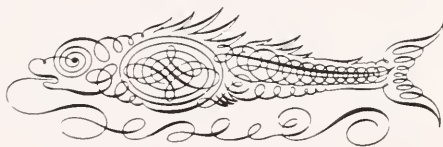


Marine Policy

Good fences do make good neighbors around where Robert Frost lived—and anyplace else where broken bars or slack wire can mean hours of trouble rounding up strays. But what about the web of sea boundaries nations are claiming for themselves or for a “common heritage”? Can one set metes and bounds for the ocean, “which rather possesses the earth than is by it possessed,” to quote from our lead article? More precisely, can this be done in a manner fair to rich and poor, coastal and landlocked, commerce, industry, science?

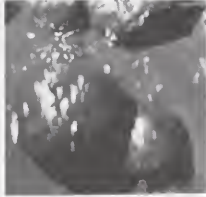
These issues will surface time and again as governments meet in conference or confrontation to reshape the law of the sea and as private citizens attempt to comply with the new agreements. In both arenas, there will be a need for men and women trained as few have been trained before to bring pure and applied research, physical and social science, to the conduct of marine affairs. The Institution, through its Marine Policy and Ocean Management Program, is helping to develop such expertise. The articles in this issue, all written by participants in the program, give a flavor of the scope, the complexity—and the importance—of marine policy.

William H. MacLeish
Editor

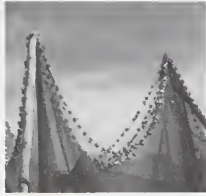


Front: *Oyster Tongers on Choptank River, Maryland*
Richard Frear, Photo Researchers

Back: *Fishermen on Niger River*
Victor Englebert, Photo Researchers



WHAT COMMON HERITAGE?
by David A. Ross. Several current proposals for dividing up the oceans could leave little on the international plate **2**



DEVELOPMENT AND THE SEA
by P. Sreenivasa Rao. For the first time developing countries will be in the majority in law-of-the-sea negotiations **6**



THE ARCHIPELAGIC PRINCIPLE
by Maureen Khin Thitsa Franssen. Claims of island chains would place strategic sea lanes under national jurisdiction **14**



RESEARCH VS. REGULATION
by Herman T. Franssen. Scientific access to waters off many a coast will be harder to come by **18**



BENEATH THE BANK
by William Ahern. If there is marketable oil under Georges Bank, ownership will not be easy to prove **24**



MODERNIZATION AND MARGINALITY
by John C. Cordell. Misapplied technology in a Brazilian fishing community **28**



PHOTO ESSAY: A-2 BY f2.8
Pictures taken aboard the Atlantis II **34**



What common heritage?

David A. Ross

Freshly dredged manganese nodules

Tenneco, Inc.

Who owns the oceans? Despite the international attention it is currently receiving, the question is an old one. Pope Alexander VI provided one of the first formal answers in 1493 by dividing the oceans between Spain and Portugal, the major sea powers of the day. That "right" lasted as long as did the might to enforce it—until the British and bad weather defeated the Spanish Armada in 1588.

Before Alexander, and after him, there were innumerable customs and covenants concerning this bay and that strait and the people who sailed them. But there was no commonly accepted thought regarding ocean ownership until the writings of Hugo Grotius, a seventeenth-century Dutch jurist and statesman, began to gain favor among maritime nations. The ocean, wrote Grotius in 1609, "which rather possesses the earth than is by it possessed . . . cannot become private property. Hence it follows, to speak strictly, that no part of the sea can be considered as the territory of any people whatsoever". Grotius' "Freedom of the Seas"

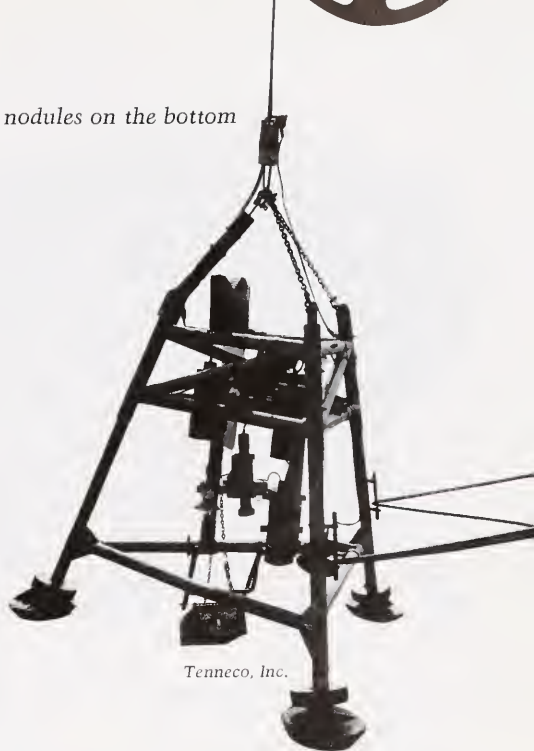
came to be regarded as freedom of the high seas; coastal nations claimed sovereignty over coastal zones, or territorial seas generally, out to the distance of three miles—effective cannon range at the time. Seaward of this zone, free and unimpeded passage was permitted.

The width of the territorial sea has never been fixed by international agreement, and the temptation to extend claims farther out on the continental shelves has proven irresistible. In recent decades, a 12-mile zone has become popular, particularly as regards fisheries resources (see diagram). In 1945, President Truman announced that the United States was assuming jurisdiction over the seabed of its continental shelves and their resources out to a depth of 200 meters (though not over superjacent waters beyond three miles from shore). In 1952, Peru, Chile, and Ecuador went much further in claiming control over the sea floor, fisheries, and surface waters out to a distance of 200 miles. In 1958, an international conference on the continental shelf produced a convention—to

which some 47 countries are now party—containing what has become a controversial clause: a coastal state was to have jurisdiction over the seabed out to the 200-meter isobath, or, “beyond that limit to where the depth of the superjacent waters admits to the exploitation of the said area.” In layman’s terms, if one has the technology to obtain bottom resources lying off one’s coasts at depths greater than 200 meters, one is free to take them.

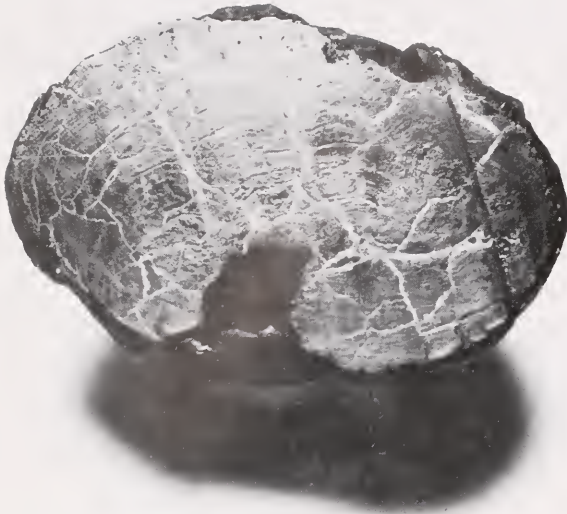
Within the last few years many countries, especially developing ones (see page 6), have come to look beyond their coasts for sources of wealth and power and to argue for territorial seas of up to 200 miles in width. There are several reasons for these views, certainly among the foremost the belief that the oceans contain a vast supply of mineral and biologic resources waiting to be harvested. Many of these same countries also feel that resources outside the 200-mile zone should belong to everyone as the common heritage of mankind. Other nations, including many who are landlocked or shelf-locked, fear that they will not receive their “fair share” of ocean resources. They support the view that the common heritage principle should apply to all areas outside a narrow (12 miles or so) territorial sea. There a number of other complex and delicate tensions surrounding oceanic claims, some of which hopefully will be eased by the 1974 Conference on the Law of the Sea, scheduled for Santiago, Chile. Certainly, though, many countries and interest groups will be unhappy with the results. Oceanographers and oceanographic research may suffer considerably if restrictive, 200-mile-wide territorial sea regimes are adopted (see page 18). Oil-importing nations and other similarly vulnerable states will be adversely affected if transit through a few straits is curtailed (see page 14).

It was precisely to discourage general adoption of sweeping territorial sea claims that the United States in 1970 suggested that the zone beyond the 200-meter isobath and outward to a depth or distance to be established be considered a “trusteeship zone”. Within the zone, the contiguous state would not have a sovereign claim but would act as trustee for the international community by issuing leases and the like for the control or exploitation of resources. In effect, the trustee, though it would not own these resources, could act to regulate them.



Tenneco, Inc.

But how bountiful are marine resources? How does their distribution fit in with current schemes and regimes for the division of oceans? The biological resources, such as fish, shrimp, seaweed, clams and lobsters, are rich indeed. Most, however, are caught within the nearshore areas, and only a fairly small percentage occurs in the deep sea or outside the 200-mile zone. Thus, the “common heritage of mankind” would not gain much from the biological resources if a 200-mile territorial sea were adapted. However, this has long been known, and those proposing the common heritage have felt that the mineral rather than living resources would supply the great future wealth. But here also much of the known resources occurs in relatively shallow waters. Sand and gravel are found mainly in the nearshore part of the shelf. The costs of recovering and transporting this resource from depths over anything more than a few fathoms are prohibitive. Marine oil and gas, at least in the near term, will be taken from the continental shelf where thick sedimentary sequences and the structure necessary for oil and gas accumulation are found (see *Oceanus*, Spring 1973). It is not anticipated that significant oil and gas resources occur on the continental slope, although some potential may exist for the deeper continental rise (usually 2,000 or more meters in depth). However, the technology and high cost associated with drilling on the continental rise make exploitation improbable within the next decade or two, or perhaps ever. Thus, if territorial seas are to be



A nodule, dried and polished

extended to 200 nautical miles, the international community would gain little in the way of conventional energy resources.

There are really only three deep-sea mineral resources that stand any reasonable chance of being exploited in the near future. These are heavy, metal-rich muds, such as those from the Red Sea, phosphorite, and manganese nodules. The Red Sea muds (see *Oceanus*, June 1967) contain large and valuable amounts of copper, lead, and zinc, but the recovery and refining problems associated with this deposit may prohibit its exploitation. In any case, this deposit, which lies essentially midway between Saudi Arabia and Sudan in what lawyers refer to as an inland sea, would belong to these two countries, according to some mutually agreeable formula, regardless of any outcome of the Law of the Sea Conference. No other known metal-rich muds have metal concentrations high enough to warrant their recovery as an ore at present.

Phosphorite generally is found on shallow banks and areas isolated from a large supply of sediment. Deposits found on the sea floor are apt to be lower in grade than those that can be more easily mined on land. In addition, land resources are probably sufficient to meet demand for several hundreds of years.

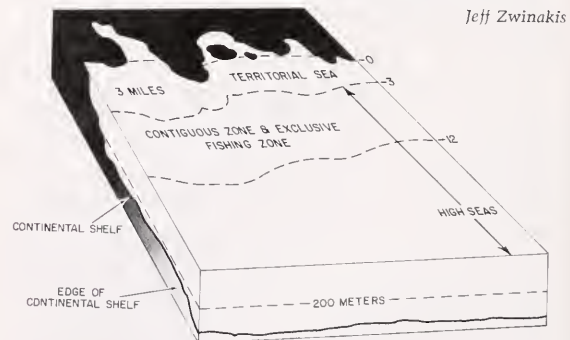
The one remaining potential resource is manganese nodules. Though early estimates of the nodules' commercial value have been questioned, recent studies have delineated some areas in the Pacific containing nodules assaying at 1.5% copper, and 1.8% nickel. These values are respectable and could be sufficient to pay for harvesting and refining the nodules. Indeed, several companies, including Hughes and Tenneco, already have made significant

investments in preparation for nodule "mining". But even so, the size of this resource is insignificant when considered in terms of the common heritage of mankind. K. O. Emery, P. M. Fye, and George Cadwalader* note that the total annual value of copper, nickel, manganese, and cobalt production (significant amounts of these latter two elements could be recovered from manganese nodules) is less than \$6 billion. Assuming optimistically that 10% of this market could come from the sea and that 10% of that output could be taxed by an international authority, less than \$60,000,000 would be realized. Ironically, most of the metals are now produced by developing countries, which thus would suffer from a successful marimining venture.

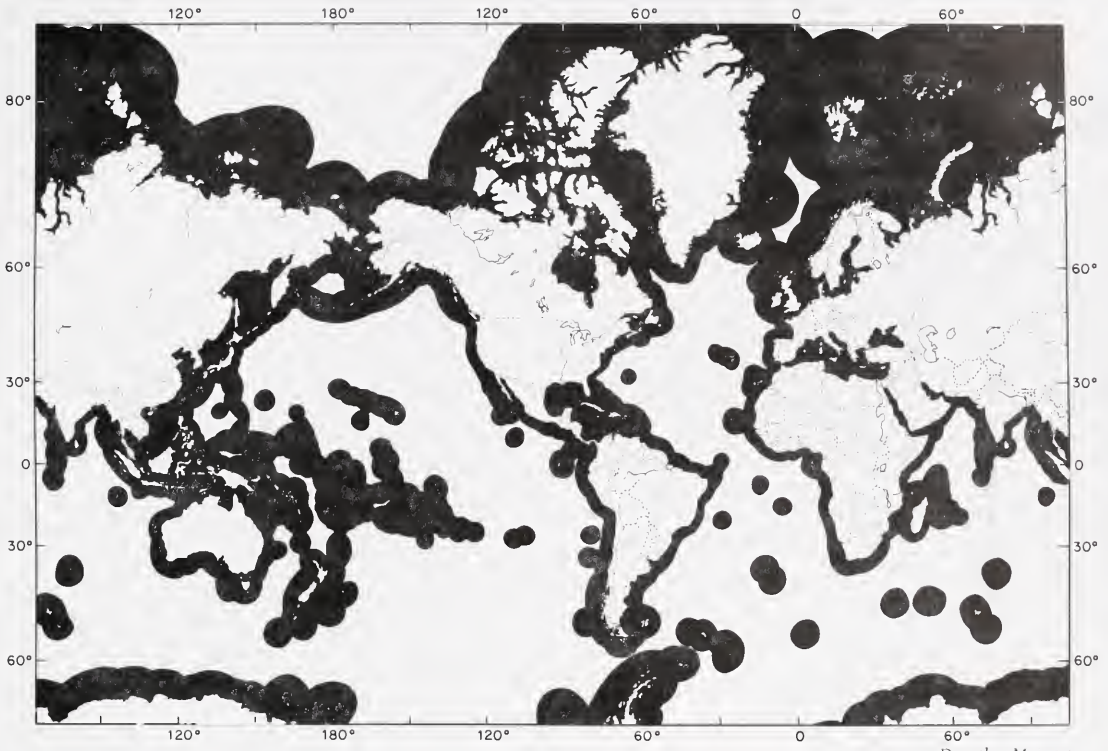
Based on what we know about the mineral resources of the sea floor, most of the valuable deposits are on continental shelves already under the control of the coastal states. If a 200-mile territorial sea is adopted, little will be left to comprise the common heritage. If the countries of the world are really anxious to share the resources of the oceans, they might begin by considering the sharing of those resources within 200 nautical miles off their coast rather than jealously guarding them and graciously giving up the little that remains. Future generations may discover other deep-ocean resources that make the common heritage a viable concept, but for the moment it is no more than an empty phrase.

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* K. O. Emery, P. M. Fye and George Cadwalader, "Public Policy Towards the Environment, 1973: A Review and Appraisal", *Annals of the New York Academy of Sciences*, 1973, Vol. 216, pp. 51-55.

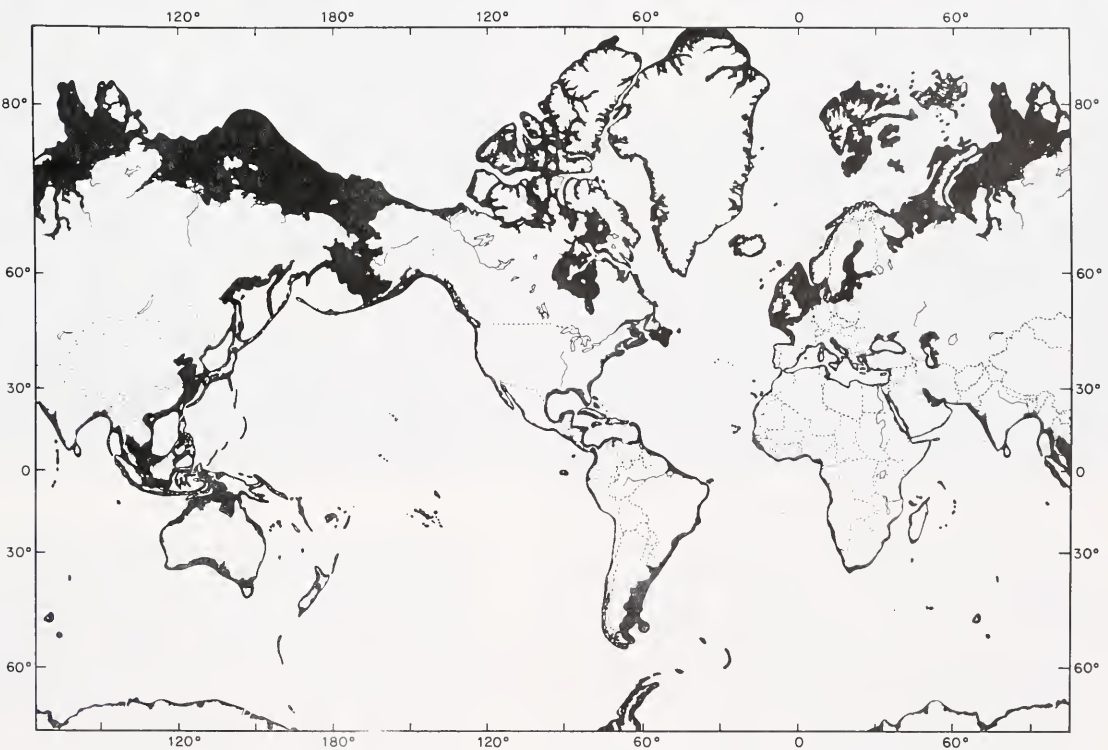


Conventional divisions of coastal waters



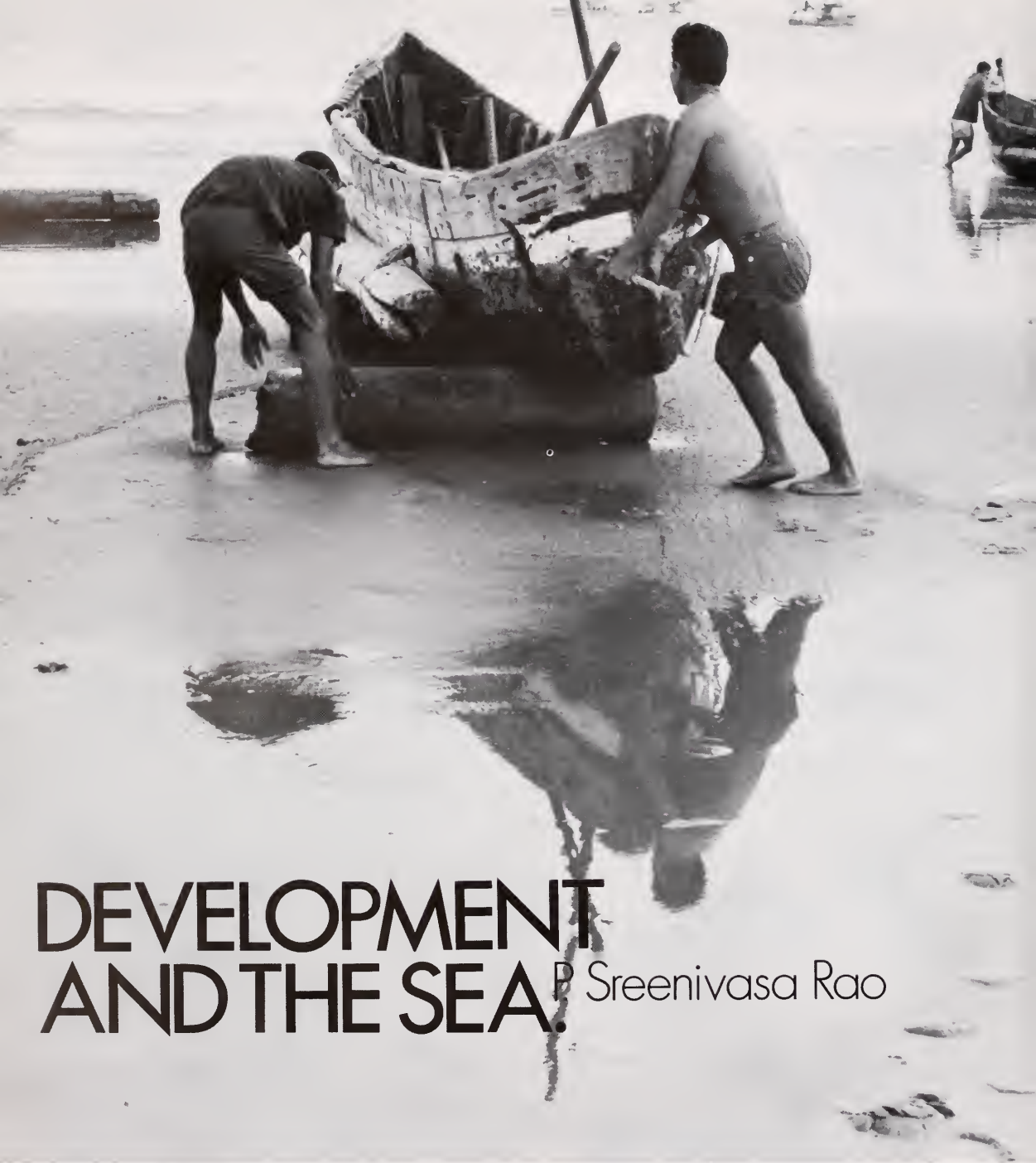
Areas within hypothetical 200-nautical-mile resource zone

Dorothy Meinert



Areas that would be inshore of 200-meter isobath. Note how Mercator projection distorts polar regions; in reality Greenland covers 840,000 square miles, Australia 2,967,000

Dorothy Meinert



DEVELOPMENT AND THE SEA.

P. Sreenivasa Rao

Ecuadorean fishermen

In December, 1972, the General Assembly of the United Nations decided to convene the third Law of the Sea Conference (LOS). The Conference is scheduled initially in two sessions. It will open in New York in the fall of 1973 with a discussion of mainly procedural and organizational matters. Substantive issues will be taken up some months later in Santiago, Chile.

The decision to convene the third LOS Conference* came after a prolonged consideration

of issues relating to the law of the sea by the United Nations over a period of six years. During this period, discussions ranged from a mere exchange of information to hard negotiation of national interests. What began as a modest enterprise to modify the law of the sea soon led to extensive questioning of the very foundations of the public order of the oceans.

* The first conference was held in 1958, the second in 1960, both in Geneva.



FAO (S. Larrain)

The third LOS Conference now has a mandate not only to modify the existing law of the sea but to change it radically, if that can be accomplished within the contemporary political framework. The conference will be attended by more than 130 independent, sovereign states. Importantly, the developing countries, scarcely a force in previous marine conferences, will constitute a predominant majority among participants at New York and Santiago.

There is no commonly held criterion to identify a developing country. However, all countries in Africa except South Africa and Rhodesia; all countries in Asia except Japan; all countries in the American continents except the United States and Canada—all these plus Fiji, Malta, and Cyprus are generally so defined. The per capita income of these nations is low, ranging from \$50 to more than \$300. But differences far exceed similarities when one examines cultural traditions, ideological affiliations, forms of government, and levels of national intellectual and technical resources.

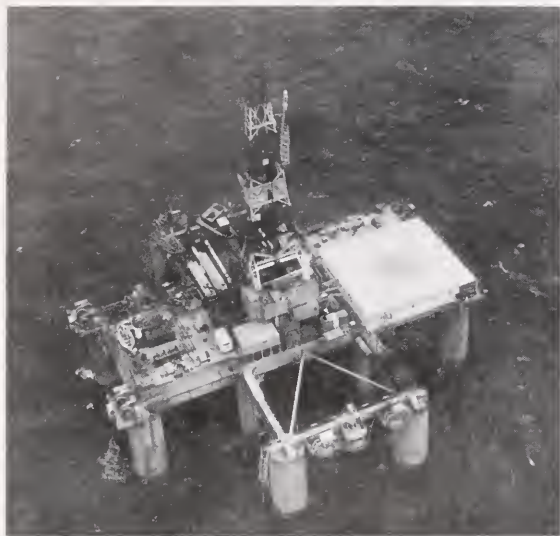
In the majority or not, the developing nations will come to the conference with serious weaknesses. These include: a lack of firsthand knowledge about offshore geography and resource potential and of expertise in the employment of that knowledge; poor coordination in the projection of coherent national ocean policies; and shortages of financial resources to represent themselves adequately at the numerous negotiating forums. Despite these disadvantages, they have managed to articulate their interests and helped to forge strong interest groups.

On almost every aspect of the different arguments which will be examined, there is no monolithic "developing country" position, just as there is no "developed country" position. In the context of ocean policy formulation, it is more appropriate to categorize nations in terms of landlocked, shelf-locked (those with offshore areas whose depth never exceeds 200 meters) and other coastal states; distant-water and coastal-fishing nations; major or minor maritime powers; major or minor energy consumers; or supporters or opponents of open access for scientific research at sea.

Landlocked countries, with no direct access to the sea, tend to be opposed to extensions of coastal state jurisdiction. Rather, they favor enlargement of the maritime area, whose benefits can be shared equitably by all states. Shelf-locked states are inclined toward limiting coastal state jurisdiction to modest depths. Both groups of countries have opted for comprehensive international machinery to administer the resources of the high seas.

Other coastal states, on the other hand, would gain almost all the economically attractive

Dr. Rao holds a doctorate in law from Yale. He is currently completing a book on the legal regime of the non-living resources of the sea.



Semi-submersible drilling rig in North Sea

oil, gas, and hard-mineral resources off their coasts by claiming extension of their jurisdiction to a depth of up to 2,500 meters. Similarly, these countries can gain exclusive control of major fisheries by extending their jurisdictional claims to 200 miles. It is with this in mind that some African, Caribbean and South American states have proposed the so-called "economic zone" and "patrimonial sea" concepts, which would legitimize such control.

Under present international law, several countries fish all around the world beyond the 12-mile offshore zone. These high-seas fishermen (including the Soviet Union, Japan, U.K., France, West Germany) are known as distant-water fishing nations. Clearly, their activities would suffer in the event the "economic zone" or "patrimonial sea" concept were to be adopted. Thus, while it is in the interest of some coastal nations to extend their oceanic claims, those with long-distance fleets to consider will oppose such a move.

According to one expert estimate, if claims are extended for whatever reason much beyond the present customary limit of 12 miles, at least 116 straits now open to free transit will come under coastal state jurisdiction. These include Malacca, Gibraltar, and Bab al Mandab (at the southern end of the Red Sea). Obviously, such a situation would affect the interests of several maritime powers, and it is understandable that they should be in the forefront of strategies to insure maintenance of the right of free transit. They are joined by nations such as Japan, which depend on large supplies of imported gas and oil and are thus

anxious to avoid unreasonable coastal state regulations on maritime transport involving supertankers. On the other hand, Indonesia, Spain, Turkey, Yemen and other countries bordering many of the straits in question are afraid that unregulated foreign passage through their territorial seas will result in hazardous pollution and threatening military activities close to their coasts.

In an attempt to broaden the base of agreement among themselves, some developing

United Nations



Fishing with Salakab net in the Philippines

countries, particularly those espousing the "patrimonial sea" and "economic zone" concepts, often do not differentiate among marine uses they seek to regulate. Thus, fishery resources are often lumped in with energy and mineral resources. By opting for common boundaries and common institutions for both living and nonliving resources, governments are apt to ignore differences in the location of these resources as well as factors affecting their renewability and incentives necessary to optimize their exploitation.

Further, many developing coastal nations advocate what appear to be contradictory positions. They support an exclusive coastal state jurisdiction over nonliving resources up to the edge of the continental margin, or up to a depth of nearly 2,500 meters, and over living resources within 200 miles of the coast. At the same time, they insist on the creation of comprehensive international machinery to govern resources of the maritime areas beyond such limits. According to available information, there are hardly any economically attractive

nonliving resources beyond a depth of 3,000 meters except for manganese nodules, whose value, at the moment, is still in doubt. So also, beyond a distance of 200 miles, the potential for fishery resources is rather minimal compared to what it is within 200 miles. Under the circumstances, insistence on comprehensive international machinery for such deep and distant ocean areas reflects either naïvety or a diplomatic ploy to placate landlocked and shelf-locked countries.

It is unfortunate that the developing countries as a group do not show determination to fight for truly effective international machinery to regulate exploitation of ocean resources. A few of them even doubt the relevance of international organizations to their national well-being. In defending their extensive claims over maritime resources, the representatives of these countries point out that it is realistic to defend one's own interests.

The hard reality is that the developing countries have consistently benefited from international institutions. They themselves

FAO (S. Larrain)



Nets drying in Ecuador

endorse this fact by demanding more economic aid and technological transfer through multilateral organizations than through bilateral processes. Under bilateral conditions, the developing countries must often contend with participants who bargain from a position of strength. Further, it is clear that the international institutions have provided a forum for the developing countries to unite among themselves and to press their cases from a stronger moral and political base. Indeed if

these international institutions did not exist, the developing countries would have found it necessary to create them, if only to insulate themselves against the harsh facts of bilateral dealings in a world of striking inequalities.

Some of the coastal developing countries have not yet considered alternatives in the event the maritime areas to which they intend to lay claim yield little or no economically attractive resources. Many have not faced the realities—assuming resources turn out to be plentiful—of competing in world markets, negotiating with well-equipped, profit-oriented private business associations, or raising capital and developing the infrastructure basic to successful resource exploitation.

The "patrimonial sea" and "economic zone" concepts face opposition from the landlocked and shelf-locked developing countries, who seem equally determined to preserve and enhance their own share of ocean wealth. They are also opposed by strong developed nations who regard a continued share in the high-sea fisheries as absolutely vital to their economy. If the ease for extensive jurisdiction is pressed too hard, with no efforts to accommodate others whose concern for personal well-being is just as strong, a breakdown of the third LOS Conference is likely. Such a situation would indeed be a tragedy and an anticlimax to a very hard and long negotiating process. In its aftermath of "everyone for himself," it is the developing countries which will be at a severe disadvantage.

The most promising path toward progress under the circumstances is to limit coastal states'

... and in Martinique



FAO (H. Mamaud)

MARINE AREAS CLAIMED UNDER DIFFERENT REGIMES

Outer Limit of Coastal State Jurisdiction	Greater than 200,000 sq. miles		Greater than 20,000 sq. miles		Less than 20,000 sq. miles	
	Countries Total	Developing Countries	Countries Total	Developing Countries	Countries Total	Developing Countries
200 meters	8	4	33	18	65	54
3000 meters	15	6	56	45	35	26
200 miles	27	15	58	49	21	12

Source: John P. Albers et al. *Summary Petroleum and Selected Mineral Statistics for 120 Countries, including Offshore Areas. Geological Survey Professional Paper # 817 U.S. Gov't. Printing office (1973), p. 125.*

LANDLOCKED AND SHELF-LOCKED* COUNTRIES

<i>Landlocked (30)</i>		
<i>Asian</i>		
Afghanistan	Zambia	Jordan
Bhutan	<i>Latin America</i>	Kuwait
Nepal	Bolivia	Qatar
Laos	Paraguay	Singapore
<i>African</i>	<i>Others</i>	United Arab Emirates
Botswana	Andora	Vietnam (North)
Burundi	Austria	<i>African</i>
Central African Rep.	Czechoslovakia	Togo
Chad	Hungary	Zaire
Lesotho	Liechtenstein	<i>Others</i>
Malawi	Luxembourg	Belgium
Mali	Mongolia	Denmark
Niger	San Marino	Finland
Rhodesia	Switzerland	Germany (East)
Rwanda	Vatican City	Germany (West)
Swaziland	<i>Shelf-locked (20)</i>	Monaco
Uganda	<i>Asian</i>	Netherlands
Upper Volta	Bahrain	Poland
	Cambodia	Sweden
	Iraq	

*Those with offshore areas whose depth does not exceed 200 meters.

Source: Lewis M. Alexander, "Indices of National Interest in the Oceans," Vol. 1, *Ocean Development and International Law Journal* (1973), p. 37.

exclusive maritime area to a reasonable degree, perhaps 1,000 meters or 100 miles, in order to bring marine resources under international regulation in sufficient amounts to make such regulation feasible. An arrangement of this sort would prove to be an insurance against total disappointment for certain coastal states which for one reason or the other find themselves unable to gain any personal profit from their maritime areas. It would provide a realistic way of accommodating the interests of other geographically disadvantaged states. And it would encourage the work of institutions of inclusive authority and common sharing, the only bodies which can fully appreciate and cope with the intricacies of an increasingly interdependent world.

The third LOS Conference should quickly decide on limits for the exclusive coastal state maritime resource jurisdiction. Further, it should lay down specific policies to regulate ocean resources beyond the limits of

national jurisdiction. It should also come to grips with the precise structure of international machinery.

In the case of the living resources of the seas, it appears appropriate to rely on regional bodies to implement rather broadly conceived international policies which can take advantage of the existing fisheries bodies and commissions. On the other hand, a rather centralized procedure for organizing the exploitation of nonliving resources is desirable. Such a mechanism is necessary to develop limited and vital resources on a cooperative rather than competitive basis, keeping global energy needs and demands in perspective. As for navigation, inclusive access with minimum necessary regulations will best promote greater flow of international trade. By working for these policies, the developing countries could not only contribute to their individual and collective well-being but also to the establishment of optimum world public order.

Tanker loading at Cook Inlet, Alaska



Joe Rychetnik/Photo Researchers

WORLDWIDE ULTIMATE RECOVERABLE OFFSHORE GAS RESERVES AND CUMULATIVE PRODUCTION

(Billions of Cubic Feet)				
	Estimated Ultimate Recoverable	Cumulative Production 1-1-72 (Except as Noted)	Number of Offshore Fields	
			Giant	Other
Africa				
<input type="checkbox"/> Egypt	1,000	NA		1
<input type="checkbox"/> Gabon	NA	NA		1
Total	1,000	NA		2
Asia				
Middle East				
<input type="checkbox"/> Saudi Arabia	3,600		1	
<input type="checkbox"/> Kuwait-Neutral Zone	875	37		1
<input type="checkbox"/> Union of Arab-Emirates	2,165	NA		NA
Total	6,640	37	1	NA
Europe				
<input type="checkbox"/> United Kingdom	29,500	1,131	4	19
<input type="checkbox"/> Norway	10,000	0	1	1
<input type="checkbox"/> Denmark	500	0		2
<input type="checkbox"/> Netherlands	NA	NA		11
<input type="checkbox"/> Italy	NA	300		12
Total	40,000	1,431	5	45
North America				
<input type="checkbox"/> United States	39,463	20,606		NA
Total	39,463	20,606		NA
Caribbean				
<input type="checkbox"/> Trinidad-Tobago	3,500	39		6
Total	3,500	39		6
Oceania				
<input type="checkbox"/> Australia	10,300	48	3	8
<input type="checkbox"/> New Zealand	6,000	0	1	
Total	16,300	48	4	8
World Totals	106,903	22,161	10	<i>Incomplete</i>

John Albers, U.S.G.S.

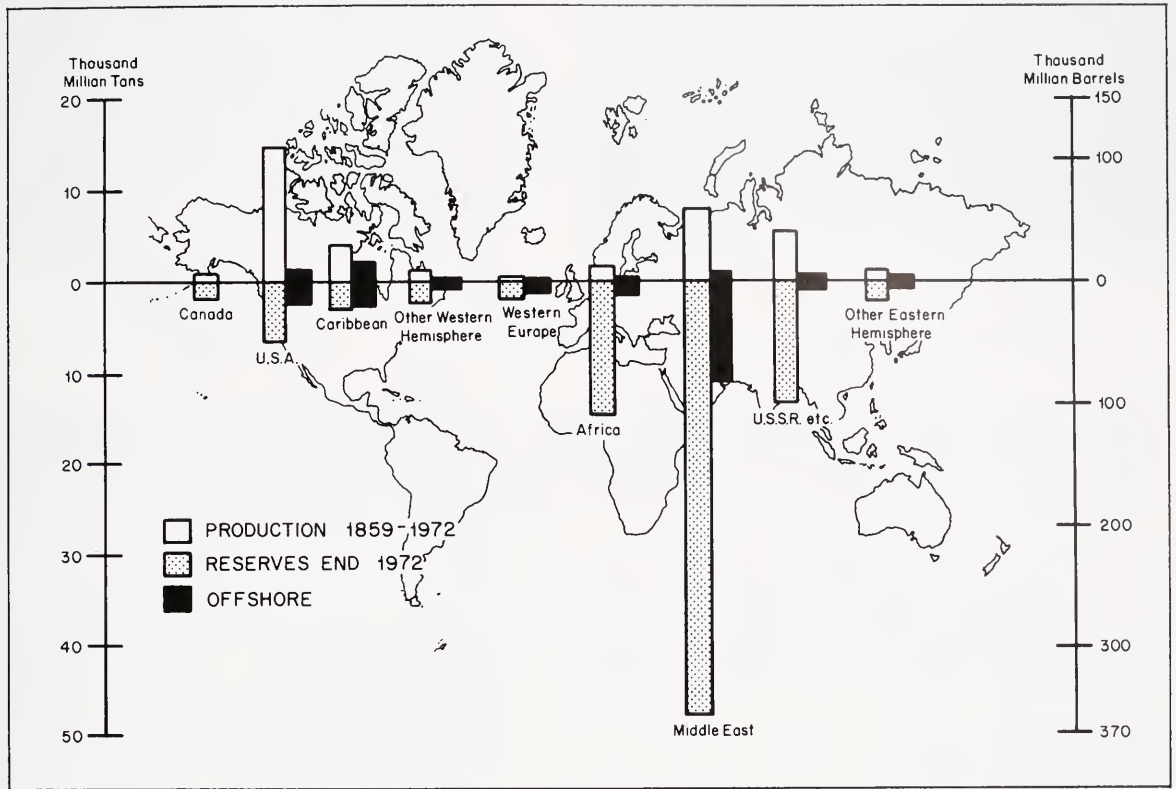
WORLDWIDE ULTIMATE RECOVERABLE OFFSHORE OIL RESERVES AND CUMULATIVE PRODUCTION

(Millions of Barrels)				
	Estimated Ultimate Recoverable	Cumulative Production 1-1-72 (Except as Noted)	Number of Offshore Fields	
			Giant	Other
Africa	9,401	1,317	7	49
Asia				
<input type="checkbox"/> Persian Gulf	95,933	6,039	21	16
<input type="checkbox"/> Far East	3,654	296	1	30
Total	99,587	6,335	22	46
Europe	12,011	679	7	33
South America	23,949	15,817	9	11
North America	17,764	7,280	9	290
Oceania	2,876	312	4	6
World Totals*	165,588	31,740	58	435

*Of the world total, 81 percent is in the 58 giant fields.

John Albers, U.S.G.S.

WORLD OIL DISCOVERY



John Albers, U.S.G.S.

- Suggested further readings in this field include:
1. Rao, P. Sreenivasa, "Offshore Natural Resources Exploitation: An Evaluation of African Interests", 12 *Indian Journal of International Law*, pp. 345-367, 1972.
 2. McDougal and Burke, *The Public Order of the Oceans*, Yale University Press, New Haven, Connecticut, 1962.
 3. Pinto, Christopher W., "Problems of Developing States and Their Effects on Decisions on Law of the Sea", in Lewis M. Alexander [Ed.], *The Law of the Sea: Needs and Interests of Developing Countries*, University of Rhode Island, Law of the Sea Institute, February 1973, pp. 3-13.



Jeff Zwinakis

Indonesia and the Philippines are pressing for world recognition of their claims to territorial seas measured around the entire island group rather than around individual land masses. Indonesia measures its territorial waters (1) as a twelve-mile strip seaward of straight baselines (2) connecting the outermost points of its islands. The Philippines extends territorial jurisdiction from its baselines to the old "Treaty Limits" line set many years ago. Both countries regard waters landward of the baselines as internal or national waters. The archipelagic approach could affect a number of straits heavily used by international shipping, such as the Strait of Malacca (3). Note area of overlapping jurisdiction (4).



THE ARCHIPELAGIC PRINCIPLE

Maureen Khin Thitsa Franssen

Recent developments in the world have had a profound effect on the classical law of the sea. What we are witnessing today is the revolt of many new countries which previously had played little or no role in the creation and development of that law. These nations are determined to have a voice in the progressive development of international rules and regulations governing the oceans, subsoil and seabed. They are no longer willing to step obediently into the old clothes of an international order measured and designed to fit the interests of Western Europe. Existing international agreements, considered by the major maritime powers as "traditional and well-established rules of customary law", are being challenged, and where no provisions formerly existed for certain unique or peculiar situations, fresh prescriptions governing the seas are being put forward, espoused and actively advocated by the new nations.

One of the most significant of these is a concept first advanced as national positions by the two archipelagic states of Asia—Indonesia and the Philippines—in the 1950's.* The idea: to treat islands forming an archipelago as a single unit, with the territorial sea measured around the islands as a group rather than around each single island.

Provisions covering the national territory of the Philippines (including internal waters and territorial sea**) were laid down over a number of decades by treaties signed by the United States, Spain, and the United Kingdom. In 1961, Manila formalized these provisions in an "Act to Define the Baselines of the Territorial Sea of the Philippines". The waters between the baselines

and the so-called "Treaty Limits of the Philippines" (see map) are considered territorial sea. While baseline and treaty limits virtually coincide in the southwest, in the northeast they are separated by approximately 285 nautical miles of sea.

Perhaps the treaty signatories recognized the special position of the Philippines in the law of the sea, having been responsible for laying down the rules and regulations for measuring its maritime areas. Perhaps the ocean powers did not consider the archipelago of critical strategic importance. In any event, only one power—the

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* The first formal proposal along these lines was in 1924 at the 33rd meeting of the International Law Association. See Mochtar Kusumaatmadja, "The Legal Regime of Archipelagoes: Problems and Issues", in L.M. Alexander [ed.], *The Law of the Sea: Needs and Interests of Developing Countries, Proceedings of the 7th Annual Conference of the Law of the Sea Institute, University of Rhode Island, June 26-29, 1972* (Kingston, Rhode Island: U of Rhode Island, 1973), p. 166.

** There is a key distinction between internal or national waters and the territorial sea of a given nation. In the former, the national government has complete authority to permit or deny access to foreign vessels as it sees fit. In the latter, though its waters are under the government's jurisdiction, foreign vessels in navigation enjoy the "right of innocent passage".

United States—reacted noticeably to the 1961 declaration that henceforth all waters around, between, and connecting the 7,000 or so islands were to be considered national or inland waters, subject to exclusive Philippine sovereignty. That reaction was limited to an ambassadorial protest.

On the other hand, Indonesia occupies a central geographical position in Southeast Asia. Territorially, it is the largest archipelago in the world—3,000 islands extending as many miles across the Indian and Pacific Oceans (see map). Though Indonesia's claims were similar to those of the Philippines, its position was promptly greeted with strong criticism, chiefly from the major maritime powers, who feared that:

1. The Indonesian claim might very well result in the closing off of many international straits of vital importance to their commercial and military interests. Such an action, for example, could force Japan to pay staggering prices for Middle East oil, its industrial lifeblood, due to the lengthy detour tankers would then have to take.

2. Large areas of ocean space, customarily used for high seas fishing and other international activities, would be withdrawn.

3. Should the Indonesian claim be endorsed by the world community, other small groups of islands, in particular the Trust Territories in the Pacific Ocean, might espouse similar claims and seek control of ocean space out of proportion to the actual size and importance of these island groups. Permission would have to be sought to enter these internal or national waters, while some restrictions might be placed even on innocent passage through the vastly extended territorial sea of such archipelagic states.

Indonesian advocacy of the archipelagic concept came in large part as a reaction to the method of measuring the territorial sea imposed by the Dutch—"three miles from straight lines connecting the outermost points of the low-water mark of the islands on the outer edge of the group at the point where distance between these points is not more than six miles." Even though certain

water bodies were enclosed by Dutch legislation, Indonesia's former rulers appear to have ignored the special nature of archipelagos. In theory at least, their law gave each island its own narrow territorial sea beyond which ships of other nations could traverse and fish at will in and out of the island chain.

The inadequacy of the Dutch method became fairly obvious to the Indonesians who watched Japanese boats masquerading as innocent fishing vessels moving close inshore to map the islands in preparation for World War II. Upon gaining independence in 1949, the young republic cast about for legal models on which to base realistic claims to surrounding waters, only to discover there were none.

This being the case, Indonesia felt justified in determining its own position on the subject (while taking due account of existing theories on international law). In 1956, a committee was set up by the Indonesian government to study and recommend revisions in the existing law on territorial waters. After considerable study and debate, on the recommendation of this committee Djakarta announced on December 13, 1957 that it intended to change the maritime laws obtaining in the Indonesian archipelago to the extent that, in essence, "all waters surrounding, between and connecting the islands constituting the Indonesian state, regardless of their extensive breadth, are integral parts of the internal or national waters, which are under the exclusive sovereignty of the Indonesian state." In addition, the breadth of its territorial sea, increased to 12 nautical miles, would be measured from straight baselines connecting the outermost points of the islands of Indonesia.

In order to get wider world acceptance of the archipelago concept, Indonesia decided to bring up the matter before the Geneva Conferences on the Law of the Sea in 1958 and 1960. However, at that time, the concept was still too revolutionary to be accepted by most participants. In spite of the brave efforts of both Indonesia and the Philippines, very little

Severe restriction of shipping in Indonesian waters could force tankers bound from the Middle East to Japan to take an extremely expensive detour

attention was given to it. Yet the rejection was not complete: active support came from unexpected quarters—Yugoslavia and Denmark.

Following the Geneva Conferences, Indonesia continued to press its case. Presented by able and highly eloquent spokesmen, such as Mochtar Kusumaatmadja, J. J. G. Syatauw, Hasjim Djalal and others, the arguments for a special archipelagic regime has found increasing sympathy among many nations of the world. In addition to the Philippines and Indonesia, the following states have applied the concept of treating the islands forming an archipelago as a geographic unit: Ecuador (the Galapagos Islands), Iceland, the Faroe Islands, and Fiji—the latest adherent to this concept. The people of other island groups, such as Nauru, Tonga, Western Samoa, the Cook Islands, and the recently independent islands of the Bahamas may well follow suit.

Thus, we see that what started out as a novel Asian concept with but two adherents has today become a reality commanding wide support in the world community. While little attention was given to it in earlier international forums, it will be debated at great length at the forthcoming third Law of the Sea Conference. Clearly, the time has come for serious negotiations and for accommodations that will enable the archipelagic principle to take its place in contemporary international law.

For more detailed reading on this subject:

1. Djalal, Hasjim, "The Concept of Archipelago Applied to Archipelagic States", A paper submitted to the Working Group of the Subcommittee on the Law of the Sea of the Asian-African Legal Consultative Committee (New Delhi), 1971.
2. Syatauw, J.J.G., "Indonesia and the Law of the Sea", in *Some Newly Established Asian States and the Development of International Law* (The Hague: Martinus Nijhoff), 1961.



Margot S. Granitsas/Photo Researchers

Official Navy Photograph



Indonesians do not forget the strategic importance of nearby waters during World War II.

RESEARCH VS. REGULATION

Herman T. Franssen

The debate over whether or not scientific research at sea should remain free from coastal state regulation is not conducted in a legal or political void. It is part of the larger problems of the division of the ocean resources and the relationship between scientific research and the exploitation of those resources. These issues are presently being debated at the Preparatory Conferences on the Law of the Sea in Geneva and New York, where a new Law of the Sea Conference is being prepared—one likely to result in a new division of the oceans. Territorial limits are not expected to exceed 12 miles. There may be a zone of limited national jurisdiction over resources extending out to 200 miles from the coast. Beyond that area, some jurisdiction over the exploration and exploitation of resources may be given to an International Regime. Scientific research will almost certainly be controlled by the coastal state within territorial limits and be subject to some regulations in the area of limited national jurisdiction. Oceanic research beyond the area of limited national jurisdiction may continue to be free from restraints.

Except for a few letters of complaint to the Intergovernmental Oceanographic Commission of UNESCO during the late Sixties, little is known about the problems that ocean scientists from countries other than the United States encounter in their efforts to gain access to foreign waters. However, American records over the past ten years indicate a rapidly deteriorating situation for the right to conduct marine research on the continental shelves and superjacent waters of many nations. Whereas the Department of State reported only six instances in which American vessels were refused access to foreign waters from 1963 to 1966, the situation worsened considerably during 1967-1971, when over 30 refusals were reported.

These figures do not include numerous lengthy administrative delays, some of which resulted in cancellation of parts of cruises. Ship



Photo Researchers

time is usually tightly scheduled, and delays of as little as one day can seriously interfere with research programs and cost thousands of dollars. A recent study by Dr. Conrad Cheek of the Department of Defense showed 22 reported abandonments of clearance requests that were attributed to long delays and to discouraging statements or actions encountered during the clearance process. Moreover, many ocean



Diving saucer off Baja California. Indications are that Mexico will adopt a tougher stance toward research along its coasts. So will other Asian, African, and Latin American countries

scientists are no longer applying for access to certain countries because of past negative responses. The actual number of these cases is not known.

Although instances of access restriction and other impediments to research are fairly well distributed around the world, Burma, Brazil, and the Soviet Union have been most restrictive in their attitudes toward research by other than their

own nationals. Burma has never granted access for research purposes within its twelve-mile

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territorial sea, and Brazil has frequently prohibited foreign research inside its claimed 200-mile territorial limits. However, its record has improved somewhat in recent years. The Soviet Union has forbidden any geological and geophysical research on its continental shelf, invoking a restrictive claim in a 1958 convention. However, it does allow research in superjacent waters outside its 12-mile territorial sea. Similarly, the Soviets do not supply the World Data Center in Washington with information concerning their own shelves, though they have been fully cooperative in exchanging data collected off the coasts of other countries. It is possible that the recently concluded U.S.-Soviet agreement on oceanography will place the situation in better balance.

A small group of prominent U.S. ocean scientists and marine lawyers impaneled by the National Academy of Sciences, has spent years following developments related to the conduct of oceanic research. It is concerned that the present restrictive practices by a relatively small number of states will get far worse in the near future, and recent developments indicate that these fears are indeed well-founded. During the past five years, several states around the world have adopted legislation which is expected to endanger and in some cases seriously limit the conduct of oceanic research. Earlier this year, when Mexico issued new regulations on the conduct of marine research in its coastal waters, the U.S. Department of State warned the oceanographic community that access to Mexican waters might well be curtailed in the future.

On the regional level, Latin American and Caribbean nations have concluded agreements which refer specifically to the right of the coastal state to regulate oceanic research in areas of national jurisdiction. Both the 1970 Lima declaration of Latin American states and the 1972 Santo Domingo declaration of Caribbean countries refer to the right of the coastal states to extend their areas of national sovereignty unilaterally and to regulate marine research within those areas.

The ongoing United Nations ocean debate at the Preparatory Conferences on the Law of the Sea, held twice a year in New York and Geneva since 1971, has not been promising for the ocean science community. Developing countries in particular have indicated that they favor coastal state controls over scientific research, not only in the territorial sea, but also within the area of

limited national jurisdiction which, when negotiations are completed, may well extend out to 200 miles from the coast. As 96 of the 132 members of the United Nations consider themselves developing countries, their positions on scientific research will determine to a large extent the outcome of the Law of the Sea Conference for ocean science.

On the basis of a detailed questionnaire sent to most American oceanographers, the Defense Department recently discovered that 50% of all research conducted takes place on and above the continental shelf, 30% beyond the continental shelf but landward of 200 miles, and 20% beyond 200 miles. Thus, if the countries participating in the Law of the Sea Conference agree on the right of coastal states to regulate oceanic research in the area beyond a narrow territorial sea of twelve miles, about 80% of all oceanic research will be affected. That is not to say that all countries would exercise these rights to the fullest extent, but it does mean that most scientists would be affected in some way or another by restrictive regulations. If past experiences are any guideline for the future, we may expect that research related to ocean resources, such as biological research concerning fisheries and geological and geophysical surveys on the continental shelf, will be subject to more stringent regulations than research that is only distantly related to resources.

Among the more important reasons for the growing restraints on marine research in claimed coastal waters are:

- The fear of espionage and other subversive activities of the state conducting the research. [‘Project Camelot’, a plan to study subversive activities in Latin American countries during the mid-Sixties, damaged the relationship between *bona fide* scientific institutions in the U.S. and Latin America for some time. Only a few years after the ‘Camelot’ incident, the captain of the *Pueblo* told his North Korean captors that his ship was undertaking scientific research when intercepted. Although the marine science community was not involved in any subversive activities, the credibility of the American scientific community as a whole was tarnished by the actions of others.]

- The increase in the number of newly independent nations and the rapid growth of oceanic research activities in distant waters. Many developing countries lack the expertise to evaluate each project on its merits, and



Lowering instruments from the Peruvian Sea Institute's "Unanue"

FAO (S. Larrain)

there is a tendency among bureaucracies to shelve research requests if there is any doubt about the nature of the project.

•The desire of developing countries to regulate scientific research in coastal waters as part of a deliberate attempt to narrow the growing technological gap between themselves and the industrialized world. If oceanic research beyond a narrow territorial sea of twelve miles were to remain free, coastal states would not be in a position to require a *quid pro quo*. Once they control access for scientific research in the proposed area of limited national jurisdiction,

they can attempt to extract a price in return for that access. The price, as expressed by various spokesmen for developing countries, will be in the form of technical assistance to help the technological "have-nots" acquire a capability to participate in a meaningful way in the exploration and exploitation of ocean resources. Moreover, some degree of scientific and technological independence is considered a prerequisite for true political independence.

•The recurrent fears developing countries have of being exploited again by the advanced maritime powers. While scientists

from the developed countries are primarily interested in undertaking research in order to learn more about the ocean environment, general productivity, the origin of the world, and related matters, developing countries maintain that the acquired knowledge can be utilized by the industrialized countries. As a Brazilian diplomat put it recently: "In the last analysis, every particle of scientific knowledge can be translated into terms of economic gain or national security, and in technological society scientific knowledge means power".

As most developing countries are not able to analyze the data collected by scientists from advanced countries, they are reluctant to provide automatic access to their claimed coastal waters for foreign research parties, even if the latter provide them with copies of all data and pledge that the results will be published in scientific journals. Developing countries are primarily interested in the exploitation of resources. They wish to control oceanic research, which they regard as the first step toward exploitation. Therefore, the least they demand is some form of control to guarantee that research undertaken in their claimed coastal waters is of a scientific nature—that it will not impair national security nor give the developed countries additional advantage in the exploitation of resources.

Maritime nations with an ocean science capability of their own have defended the position that basic research at sea is conducted to improve man's understanding of the ocean environment. Their scientists have pointed out that the very nature of the ocean and the migratory patterns of much of its living resources, require a global research approach. To a scientist it makes little sense to stop conducting research beyond an artificial man-made border. He knows that artificial boundaries will not only affect his own research but will eventually impair proper management of resources and control of pollution.


Freedom for scientific research at sea is only one of the many issues to be discussed at the Law of the Sea Conference. Its ultimate defense will depend to a large extent on its importance *vis à vis* the interests of national security, shipping, the oil and mineral industry, and both the coastal and long-distant fishing interests. While most maritime countries

basically support the concept of freedom of scientific investigation, few developed nations with the exception of the U.S., USSR, Japan, and the United Kingdom and possibly a few more are expected to put up a fight in defense of research at sea.

The very concept of freedom of scientific research, a corollary of the ancient doctrine of freedom of the seas, is under serious attack by a growing number of developing coastal states. It is expected that the days of easy, unregulated access to foreign coastal waters are numbered. At the time of this writing, there is a distinct possibility that coastal states will receive some regulatory power over marine research in the area of limited national jurisdiction. However, it is still possible that the major maritime powers will succeed in minimizing national regulation of oceanic research in return for improved international cooperation in marine science activities and expanded technical assistance to enhance the marine science capability of the developing countries.

The United States, through one of its representatives in the U.N. Seabed Committee, Ambassador Donald McKernan, has agreed in principle to commit funds to support multilateral efforts aimed at creating and enlarging the ability of developing states to interpret and use scientific data for their economic benefit and other purposes and to augment their expertise in the field of marine science research. Scientific equipment will also be made available, along with instruction in its use and maintenance. The State Department has not yet added significantly to Mr. McKernan's statement, nor have developing countries countered with concrete proposals of their own.

Whatever the outcome of the pending Law of the Sea Conference, access to Latin American, Asian, and African waters will probably become costlier and generally more difficult to obtain. However, skillful scientists at a few ocean science institutions have already entered into bilateral and regional agreements with other governments for specific research programs. While by no means an ideal solution, such agreements provide scientists with alternatives in case coastal states receive complete or limited jurisdiction over scientific research beyond narrow territorial limits.




Free-fall electromagnetic current meter used to examine the depth dependence of the water velocity of currents. Many developing countries are concerned that complexity of advanced marine research will prevent them from benefiting from findings, even if they are given all data.



BENEATH THE BANK

William Ahern Jr.

Most marine boundary disputes that have been in the news recently involve disagreements between coastal nations and wide-ranging fishing fleets from other countries—the British trawlers off Iceland, American tuna boats off Ecuador and Peru. In New England, we are well aware of the animosity fishermen here bear for the large and efficient trawler fleets from Poland, West Germany, and



Drilling rigs may eventually come to Georges Bank, but not before proprietary as well as environmental issues are resolved.

the Soviet Union that are seriously overfishing the stocks on Georges Bank. (See *Oceanus*, Spring 1973.) The Commonwealth of Massachusetts has unilaterally proclaimed a 200-mile seaward boundary in what is to date an ineffectual attempt to protect her fishing industry.

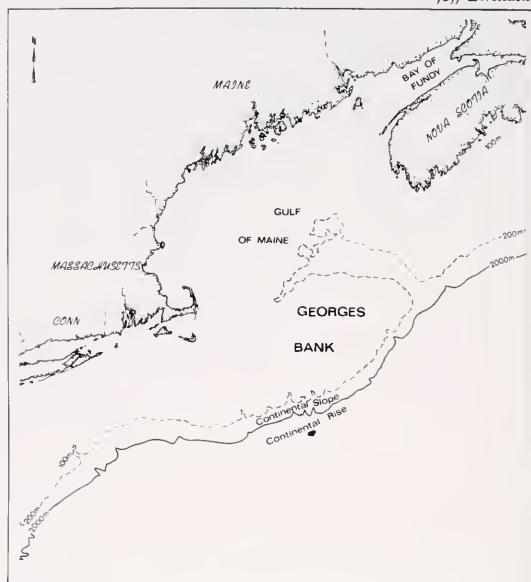
These are disputes over the ownership of marine resources in the water. In the case of Georges Bank, however, there is also a dispute over ownership of resources beneath the bottom. Thumb-shaped Georges Bank, with an area of about 10,000 square miles (2,000 more than that

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of Massachusetts), starts about 70 miles southeast of Cape Cod and extends 200 miles out to the edge of the continental shelf. Oil and gas in producible quantities may exist under the outer half of the Bank, where sediments are thick. Drillers off Nova Scotia in Canadian waters, in sediments similar to those under Georges Bank, have come up with small producible finds of gas and low-boiling-point oil. Oil companies have been pressing the Interior Department for leases on Georges Bank since the early 1960's. Exploration with the latest seismic, gravity, and magnetic equipment has been conducted over the entire Bank. The oil company data are proprietary, but the interest in leases indicates that the companies have found some favorable looking structures. Tracts on Georges Bank cannot be legally leased for exploratory drilling, however, until title to the submerged lands and the resources beneath them is settled. To understand the problem, and to put it in perspective, a brief look at the past is in order.

Nobody really cared who owned the United States continental shelf until the late 1940's, when drilling for oil moved into the Gulf of Mexico from onshore fields. It was obvious to Louisiana state officials, President Truman, and many Congressmen that selling leases and collecting royalties on offshore production would bring in millions in revenue to the government with jurisdiction over the shelf's resources. Truman felt it should all go to the federal government, but his bills were blocked in Congress. President Eisenhower was more favorably inclined toward the states. With his backing, Congress passed the Submerged Lands Act in 1953. This gave the coastal states jurisdiction over the seabed out to their "historical boundaries". The rest, termed the Outer Continental Shelf (OCS), came under federal jurisdiction. This Act avoided the ownership issue, giving the headache of determining historical boundaries to the Supreme Court. A sister act, the Outer Continental Shelf Lands Act of 1953, then gave the Secretary of the Interior the power to administer the OCS, to sell mineral leases on it, and to collect royalties from production.

To no one's surprise, the boundary issue soon came before the Supreme Court. Louisiana, Texas, Alabama, Mississippi, and Florida claimed boundaries of three leagues (10.5 miles) from their shores. The burden of proof was on the states to show they warranted more than the traditional three-mile limit. Not until 1960 did the Supreme Court resolve this question. Louisiana, Mississippi, and Alabama, it decided, were entitled to no more than three miles from their coastlines. Texas was granted its claim to three leagues because that was the seaward boundary of the Republic of Texas



Larger than Massachusetts, Georges Bank lies 70 miles off Cape Cod

when it was annexed to the Union in 1845. Florida's Gulf of Mexico boundary was also recognized as three leagues because it was accepted by Congress in Florida's new constitution when that state was readmitted into the Union after the Civil War.

The dispute with Louisiana, however, went further than the three-league—three-mile controversy. Judge Leander Perez, district attorney and undisputed boss of Plaquemines Parish and a power in the state, wanted the offshore oil revenues for local use. The state boldly claimed that its coastline coincided with the line established by the Coast Guard to define the limits of inland waters for navigational purposes. This "Coast Guard Line" was, in some places, forty miles seaward of the physical coastline. With this claim Louisiana won an injunction from the Supreme Court in 1956 halting Interior Department leasing in the disputed area. The resulting unemployment and the ire of the oil companies moved the state and Interior to enter into an agreement to conduct joint lease sales and to hold the revenues in escrow pending settlement of the case.

With its drawn-out proceedings, the Supreme Court took thirteen years, until 1969, to deny Louisiana's claim that the "Coast Guard Line" was to be used for determining its grant under the Submerged Lands Act. This released more than one billion dollars to the U.S. Treasury. Questions relating to the precise location of the geographical coast of Louisiana are still being considered by a special master of the Court twenty years after passage of the Submerged Lands Act.

California also entered court with the

federal government over claims to the oil-rich Santa Barbara Channel. The state claimed all the areas inside its offshore islands, some of which are fifty miles from land. In 1965 the Supreme Court, adopting definitions formulated at the 1958 Geneva Convention on the Law of the Sea, limited California's seabed jurisdiction to three miles from shore and to three miles around the islands. This cleared the way for federal lease sales in the Channel.

Alaska has also attempted to extend its control more than three miles seaward. The state claims that all of Cook Inlet is an historic inland sea and should come under Alaskan jurisdiction. That case is still pending.

Boundary disputes between the coastal states and the federal government clearly are nothing new. The states, quite naturally, attempt to get a share of the revenues once they learn oil and gas may be present off their shores. But state claims beyond three miles have a poor success record in the Supreme Court.

The State of Maine initiated the federal-state dispute over the continental shelf off the East Coast. In 1969 Maine sold petroleum exploration leases to King Resources, a private development firm, for an area more than 100 miles from the Maine Coast. The Justice Department, on information from Interior, brought suit against Maine to halt such leasing beyond the three-mile boundary. Massachusetts joined Maine as a defendant in the suit. Their case rests on a claim that a 200-mile jurisdiction was granted in their 17th-century colonial charter. (Maine was a part of the Massachusetts Bay Colony at the time.) Eleven other Atlantic Coast states, claiming more than three-mile boundaries, have joined Maine and

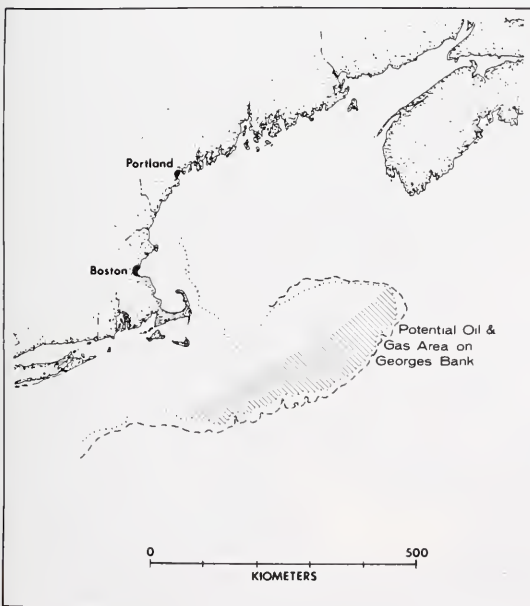
Massachusetts, so that the case now concerns thirteen state-federal OCS boundaries. In 1970 the Supreme Court appointed a special master, the Chief Judge of the Third Circuit Court of Appeals in Philadelphia, to hear testimony from all sides and to make recommendations prior to the Court's considering the case. He has said he will make his report no earlier than 1974. If any of the parties disagrees with his recommendations, the boundary issue could be before the Supreme Court for a number of years.

While this case, *U.S. vs. Maine et al.*, Original, 1969, is pending, the Interior Department cannot lease tracts in the disputed area unless an agreement is made with the states involved—in the case of Georges Bank, with Massachusetts. An arrangement could be made to hold any leasing and other revenues in escrow and to hold joint lease sales. This would be unlikely, since one of the motives of Massachusetts officials seems to be to delay any such lease sales. The strength of the environmental groups and fishing interests in the state makes such a stand a popular one.

Canada also disputes federal claims to the Georges Bank seabed. The Ottawa government claims about one-third of the Bank, the eastern third, under the 1958 Law of the Sea Convention, which provided a formula for delineating international boundaries. Since 1965 the Canadian Department of External Affairs has granted geological exploration permits, which do not allow drilling, for that part of the Bank. Washington challenged the validity of these permits in 1969, and the two countries held two rounds of inconclusive talks in 1970. The international boundary issue may be resolved at the 1974 International Law of the Sea Conference.

Georges Bank is clearly an extension of the U.S. continental shelf. It is separated from the Canadian Scotian Shelf by the Northeast Channel, which is more than 200 meters deep (see map). But a line drawn from the Maine-New Brunswick border through a point equidistant from Cape Cod and Nova Scotia puts one-third of the Bank on the Canadian side. Until the international seabed boundary is settled, any leasing by Interior or by Massachusetts would be protested by Ottawa.

Due to these legal tangles nobody will have the clear right to make a decision whether or not to lease Georges Bank for petroleum development for at least one year and, perhaps, for ten years or more. If the special master recommends against the East Coast states, they are likely to prolong the court struggle. As long as there is a small chance a coastal state might get control over the resources under the adjacent seabed, there is likely to be a boundary dispute between that state and the federal government pending before the Supreme Court.



Jeff Zwinakis

Modernization & Marginality

John C. Cordell



Raymond Nania/Photo Researchers

Scattered along the northeast Brazilian coast, many small fishing communities exist in a limbo somewhere between colonial and modern society. It is easy to treat the continuity of traditional fishing as a mere ethnographic curiosity. Many tourists who have visited fishing villages no doubt remember them as being full of happy peasants enjoying the good simple life. Admittedly, the natural beauty of some village settings helps to produce this kind of tropical beach fantasy. However, a less excusable set of myths consistently appears in the work of a group of economic specialists who have made fisheries development their primary concern. Their discipline is grounded on an a priori commitment to change, largely in the form of technical innovation. The justification for this approach is the familiar argument that because of competition with more advanced technologies, the disappearance of traditional fishing is a foregone conclusion.

The trouble with this let's-help-modernization-along philosophy is that it stresses efficiency in production alone as a criterion for group survival, thereby ignoring the complexities of the cultural context in which traditional fishermen work. In fact, if productive efficiency were as critical as some economists would have us believe, especially in an economically booming country like Brazil with no large indigenous population to assimilate, we might reasonably ask: why haven't traditional fishing communities vanished already?

As in other economically downtrodden areas of the world, small-scale coastal fisheries in northeast Brazil continue to exist for at least two obvious reasons. First, many traditional communities have evolved over a long period of time into finely balanced cultural-ecological systems so that population is allowed to expand at resource harvest rates compatible with continuing resource availability in fixed locations. Second, labor-intensive traditional fishing is usually adaptive to local economic realities—that is, as an alternative source of cash and food

in job-scarce areas.

For these reasons, often not fully appreciated by fisheries planners, traditional fishing society may be a long time passing. Paradoxically, in certain instances, this process may take even longer than if government agencies did not try to accelerate change through technical innovation. Simple illustrations of the pitfalls of fisheries modernization in a traditional setting not given a proper advance survey by administrators can be found in the fishing neighborhoods of a Brazilian coastal town of about 25,000 people situated in the State of Bahia at the head of a large estuary (see map). The town is surrounded by extensive mangrove swamps where fishermen make their homes. They use canoes to fish the swamp waterways for what amounts to a subsistence living.

Canoe fishing is perhaps the oldest fishing pattern on the Brazilian coast and is marked by a blend of indigenous, Portuguese, and African traditions. Prior to innovation, the durability of this tradition could be attributed to an elaborate system of territorial rights, which effectively prevented fishermen from competing for the same prime water spaces within the estuary. Property claims and the limited number

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Swamp fishermen of this article live south of Salvador, capitol of Bahia state



Katherine Nigh

of fishing apprenticeship opportunities controlled by boat captains also helped to regulate fishing pressure. Territoriality, in fact the timing of all fishing operations, was encoded in a lunar calendar. This calendar was observed by all traditional fishermen and aided them in processing and sorting information. As a culturally shared, four-dimensional mental map of the fishing grounds, it synchronized boat movements, the choice of fishing methods, and the availability of fishing spots according to bi-weekly and daily tide fluctuations.

The cumulative effect of these linked regulatory mechanisms was to stabilize the fishing community as a whole in an adaptive economic routine. Although the community was in theory using a common property fishery, competition was never a problem since the entire man-environment system was reinforced by a cooperative ethic that places a high value on mutual trust and respect.

Yet the purely formal elegance and complexity of canoe fishing is in sharp contrast to the poverty in the swamp neighborhoods where research was carried out in 1970. Families seem to get enough to eat by hunting crabs and shellfish, but they remain extremely poor, even by lower-class Brazilian standards. Many houses are at best only temporary shelters of sticks and palm fronds which have to be abandoned during the rainy season, when they are inundated by the tides. In this light the sophisticated system of social organization and natural history lore underlying traditional canoe fishing holds little economic potential. Its usefulness seems instead to belong to some earlier, more favorable life-style.

It is relatively pointless to study the fishermen's present adaptation to the swamp without asking a fundamental question about their economic welfare: given the inhospitable nature and limited resources in this type of environment, what are several thousand people doing there? By tradition, the fishing population did not consist of crab scavengers but rather of net fishermen, and the waters they worked were not those of the mangrove swamp but the local estuary and ocean beaches. Accordingly, the fishing economy did not always operate as it does today at a household subsistence level. Although canoe fishing had its colonial origins in family-oriented subsistence production carried on by escaped slaves, it gradually became involved in the economic expansion of local towns and eventually entered a highly active commercial phase starting around 1910 and lasting for thirty or forty years. Large quantities

of marine catfish, mullet, snook, and shark were caught and sold on the market. Then, not long ago, people turned to the swamp, again for a subsistence living, and the fishing system completed a full development cycle. Most older fishermen, in fact, had witnessed these two distinct phases in fishing specialization during their lifetimes.

It is not necessary to go back very far in local economic history to find that trouble began in fishing soon after the state fisheries agency introduced nylon nets to the area. This took place about 15 years ago, as part of a modernization program to increase productivity of inshore net fishing in the northeast. Like other development fantasies of its era, this project looked good on paper to fisheries managers in Rio, but was totally unsuited to local conditions.

In Bahia, at least, the fisheries improvement program was doomed to failure because of its single-minded emphasis on gear



efficiency. No one bothered to ask how the traditional fishing system worked in its estuarine environment, how production was organized in local communities, or what impact intensified fishing would have on marine resources. It is no surprise, then, that the modernization attempt ultimately proved incompatible with the expansion possibilities of net fishing. The main problem was purely mechanical, having to do with the fixed-territorial aspect of the fishing grounds. Canoes, without being motorized, could not venture out beyond the estuaries. Not only this, but the tides acted to restrict fishing greatly in terms of the number of suitable locations for nets (including the new nylon equipment) each day. In the long run, too many nylon nets were added, and too few water spaces were available to accommodate them in the local estuary.

Worse still in the context of these unrecognized range limitations was the mistake fishery planners made in their method of

introducing the new nets. They were originally intended for purchase by traditional fishing captains. Yet nearly all of these fishermen rejected the innovation, not out of any inherent conservatism but because they could not meet the loan repayment schedules. Consequently the nylon nets fell into the hands of wealthy middlemen (factory bosses, plantation owners, and local merchants) who could afford to speculate in fishing. Numerous fishermen were already indebted to these entrepreneurs and so were drawn into an easily exploitable pool of cheap labor.

Over the next few years a highly competitive nylon-net fishing enclave grew up in the midst of the traditional community. In the ensuing struggle for control of the fishing grounds, the previous natural balance between production units and fishing territories was shattered. A tremendous amount of cut-throat competition was generated, much equipment

At times, traditional fishermen leave the estuary to fish the surf

John C. Cordell



was destroyed and some fishermen were killed. The intensification of fishing also severely depleted some native fish stocks, such as catfish, shrimp and flounder. Economic warfare crippled the industry in general, and members of the traditional community in particular.

Pressured by the effects of overfishing, traditional captains were increasingly lured into high-risk strategies with their equipment against the better financed nylon-net specialists. These contests ended frequently in "zero-sum" games. Traditional fishermen, most of whom did not have sufficient capital to continue these games, were eventually forced to shift their base of operations to the mangrove swamp itself. They could do little to alter this situation without being organized into a fishing guild that might have provided some legal and political leverage. On the other hand, military police were often hired by the nylon-net entrepreneurs to harass the traditional neighborhoods. On several occasions nets were burned and fish confiscated.

Socially and ecologically, then, the history of canoe fishing illustrates how the traditional population was competitively excluded from the relatively superior niche it once utilized (the estuary) and forced to colonize an inferior niche (the swamp). Moreover, contrary to an assumption underlying much fisheries policy, this Brazilian coastal enterprise in practice never had

the status of a common property resource. Neither entry nor movement of production units was free, but always under the monopolistic sway of one or another power base which was able to act as if the fishery were its own exclusive domain. In the absence of formal legal sanctions, cut-throat competition simply represents the means taken by outside economic interests to evict the traditional community from its customary private fishing reserve. Competition of this nature seems to be endemic and ubiquitous in a developing society like Brazil. But it is at society's lowest levels that people can least afford the consequences.

What can the traditional fishermen do to regain a mobility foothold in the larger society? The prospects are indeed bleak. For one thing, it is difficult to re-channel specialized fishing knowledge or labor to other occupations. Even if this were possible, jobs would be exceedingly hard for fishermen to find in this part of Brazil. Local plantations have been sloughing off workers for years and with the high rate of rural-urban migration, there is a surplus of cheap labor around the town. The point is that many lower-class workers would never have turned to subsistence fishing for a living in the first place if it had not been as a last economic resort.

Job scarcity thus has left traditional net



fishermen with really only one option—to move out to the swamp and fish there, however they can. The swamp will not support them indefinitely, though. Its resources have already begun to be depleted under the pressure of a growing sedentary population. Shellfish collecting range limitations may be clearly seen in the activities of people who have lived in the swamp for only five years. As their neighborhoods expand, they must go farther and farther away from home base to achieve a desirable work-production ratio. This means that the farther out in the swamp people are forced to settle, the more remote they become from the town, which is really their only point of contact with the rest of society.

The predicament of swamp fishermen therefore raises some basic questions about directing change in traditional fisheries. First, what does the structure of traditional fishing offer as a foundation for fisheries development? Second, is it worthwhile to introduce technical assistance without simultaneously altering the production and marketing systems in question? Third, if gradual change in local fishing is in fact a practical strategy for planners, are there alternatives to investment solely in technical aid which would act equally well as incentives to increase production? Fourth, what are the real output capabilities of most peasant fishing

industries—that is, considering our responsibility to help preserve both the cultural and natural resources of the communities involved? These questions should serve as a cautionary note to development agencies concerned with fisheries. Surely it would not seem wise to encourage either the adoption of a superior and possibly over-efficient catching system, or the addition of production units of any kind in a fixed-territorial fishery before its expansion possibilities, if any, can be realistically evaluated.

Finally, I would not want to claim that the history of swamp fishermen represents a social trend for all such communities or fisheries projects. However, we should not delude ourselves about the miracles technology can work in primitive settings. Since modernization is a socially selective process, the question remains: who benefits from it, and at whose expense? In a highly stratified society like Northeast Brazil, the answer to this question is a foregone conclusion, since part of the cost of technological change is the maintenance of social inequality.

Other books relating to this article include:

1. *Forman, Shepard, The Raft Fisherman, Indiana University Press, 1970.*
2. *Furtado, Celso, Obstacles to Development in Latin America, Anchor Books, New York, 1970.*



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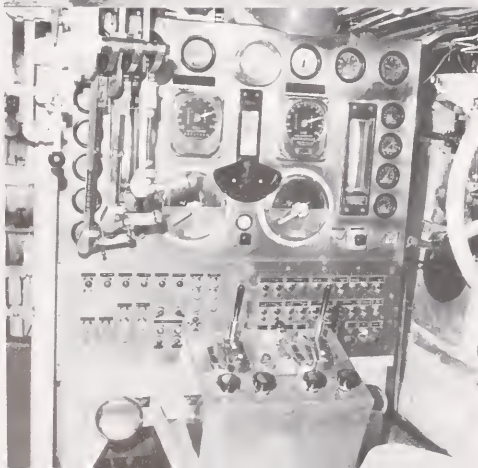


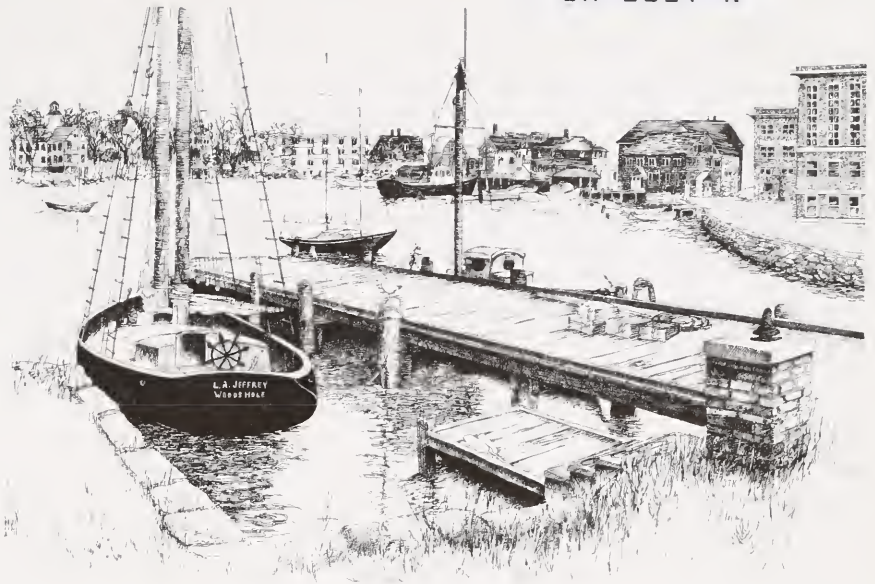
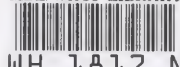
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"There be three things which are too wonderful for me, yea, four which I know not: The way of an eagle in the air; the way of a serpent upon a rock; the way of a ship in the midst of the sea; and the way of a man with a maid." (Proverbs 30:18-19.)

The way of a ship . . . the Institution's *Atlantis II*, Voyage #75, Leg #7, Las Palmas in the Canaries to Lisbon. There is the routine, the hard work, the horsing around. And there is the wonderment, a touch of it, in the midst of the sea. Pictures by Frank Medeiros, head of the Institution's Photo Lab.







Window-shoppers in Woods Hole will recognize the style of the print above. The artist is Joan Kanwisher, wife of Dr. John Kanwisher of the Institution's Department of Biology. The print at left! The style is different, but the name is the same. Susan Kanwisher's talent is her own, but the inspiration is at least partly familial.

Published by the
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts
CHARLES F. ADAMS
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Library of Congress Catalogue Card Number:
59-34518

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