

International Fisheries Management: A Plan for Action

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Abstract

The last few years have seen an alarming increase in the rate of expansion of high seas fishing capacity. It now appears that general depletion of major fishery stocks may occur before effective international management can be instituted, despite the light utilization of less desirable or accessible species.

The theoretical bases, biological and economic, for the persistent tendency toward overfishing have been adequately developed and refined in recent years. The point has now been reached where these analyses must be translated into specific research programs and techniques for multilateral management of high seas fisheries.

IN NOVEMBER, 1962, I expressed to this group my serious concern over the long run effects of unrestricted expansion of fishing capacity on the high seas. As I recall the occasion, these comments were greeted with polite interest by some, considerable skepticism by others, and outright hostility by a few. Predictions of the future are, after all, inherently "theoretical," and the more distant the unpleasant elements of reality the easier it is to ignore them or to treat them as a product of the inherently gloomy discipline of economics.

Unfortunately, the future is nearly upon us as far as the high seas fisheries are concerned. In September, 1964, a distinguished group of business executives, economists, and administrators, meeting in Rome to discuss decision-making in the fishing industry, concerned themselves most seriously with the implications of the headlong expansion of modern long-range fishing throughout the oceans of the world. The difference was that this time both the concern over the threat of general depletion and the urgent plea for practical measures to cope with it came not from the academic economist but from the practical business executive. One could hardly escape the conclusion, after listening to the expansion plans of such diverse nations as the Soviet Union, Poland, Ghana, and Argentina, that increases in catches planned for the next decade yield a figure for total landings well in excess of our present productive capacities from the sea. True, the threat of resource scarcity in the past has almost always yielded to new discoveries; to new techniques that made it possible to utilize previously under-exploited supplies; or to shifts in demand toward products still abundant and cheap. But these pressure valves do not always operate, and there are grounds for serious doubt as to their effectiveness in relieving pressure on known and available fish stocks. We are rapidly running out of ocean, and the technical revolution in fishing and processing methods that developed during the post-war years shows no signs of abating. The fact that there are still untapped fishery stocks of great size is not really relevant, since most of them are too scattered to harvest, too inaccessible to market, or too poor in taste to sell at a profit. Technology may well abate these limitations on supply, but the hard fact remains that available stocks of good marketable fish cannot be exploited rationally under present arrangements.

The seriousness of the situation can perhaps be illustrated by the experience of Ghana. This tiny West African country, with a population of about seven

million and a per capita income of less than \$250, already has a small fleet of highly efficient modern trawlers operating from Angola to the northwest African coast. Within five years Ghana will have 48 modern long-range fishing vessels in operation, most of them staffed with newly trained Ghanaian officers and crew. Surprisingly, market demand does not seem to be a serious limiting factor. In the past two or three years the Ghanaian market has been able to absorb some 30,000 tons of trawl-caught fish purchased from Russian, Japanese, and Polish vessels operating off the West African coast. The production goal is 80,000 tons by 1968 and 250,000 tons by 1975!

During the same period a single private Spanish company has built and equipped a fleet of eight modern fishing vessels, most of whose activities have been carried on along the east coast of South America. These have been successful enough to induce the firm to make plans for similar fishing operations to be carried on in both north and southeast Atlantic waters at distances up to 5,000 miles from the home port.

Multiply these examples by the dozens (and ultimately by the hundreds), and the problems of rational use of high seas marine resources of the world take on a complexion so sombre that they can no longer be viewed with skepticism or parochial indifference. Modern technology is extending the range and the sweep efficiency of the modern fishing fleet to the point where few marine fish stocks can be regarded as purely local or regional in character. No valuable fishery operating (or capable of operating) outside the territorial waters of a given state can be regarded as safe from international inroads under present conditions.

The record of the recent past is not comforting. Within our lifetime general depletion has occurred in such areas as the Barents Sea, Bear Island, and the North Sea, not to mention the near-disastrous inroads on stocks of such valuable species as halibut, salmon, and whales. The tremendous fish stocks off the west coast of Greenland and around Iceland are beginning to show distinct signs of wear, even before the full impact of Soviet and Polish fishing effort in the area has been felt. These are, of course, largely demersal fisheries, and if the record of the Pacific halibut fishery is any indication, they can be rebuilt only under an arduous long-term program of restraint. Even among the pelagic species, the yellow-fin tuna of the southeast Pacific and perhaps other stocks are apparently being exploited at or beyond maximum sustained yield. While they will rebound quickly under proper management, no general agreement on the need for or type of management is yet in sight. Meanwhile, new entrants continue to pour into the tuna fishery throughout the world. It goes without saying that anadromous species and shellfish in public grounds are subject not only to depletion but to literal destruction under unrestricted exploitation.

Quite apart from the real and increasing danger of depletion in a physical sense, there is something inherently offensive to common business sense in the prospect of 20 to 30 national fishing fleets, capable of fishing at ranges of 5,000 miles or more, all busily engaged in penetrating waters adjacent to one another's shores. A simple allocation of fishing effort by region, even on the crudest of bases, could effect enormous savings in the aggregate cost of fishing, transportation, and preservation.

In brief, the high seas fisheries as presently organized are basically irrational. They fly in the face of both biological determinants of sustainable yields and the economic efficiency requirement that any given output be produced at the lowest possible cost. Even more serious, these deficiencies are not self-correcting.

It is true that the serious depletion of given fishery stocks ultimately will force commercial enterprises to abandon them, but the present situation in the North Sea, and the disaster that is about to overwhelm the international whaling industry makes this a cold consolation indeed. Moreover, there is no assurance that such economic factors will limit the fishing effort of the planned economies (or, for that matter, of subsidized or state-operated fisheries in countries that rely primarily on private enterprise).

It would appear that we have reached the end of the talking phase in dealing with this critical situation. The basic biological and economic underpinnings of the argument that free fishing is inherently self-destructive and irrational were laid down more than a decade ago. The theoretical analysis has been considerably refined by both biologists and economists, and has been accepted as valid, with some qualifications, by thoughtful leaders in the fishing industries of most major countries. It seems almost inhuman that we could reach this level of agreement as to the nature and ultimate costs of overfishing on the high seas and still find ourselves unable even to talk about workable control programs at the governmental level.

The time has now come to mount a concerted attack on the whole range of problems associated with internationally shared marine resources. The magnitude of the tasks to be accomplished is staggering. And, probably for that very reason, few nations have been willing to tackle, alone or in joint effort, more than a small portion of the essential work. There are, of course, exceptions: investigations of the North and South Atlantic; the Indian Ocean Expedition; and the work of the International North Pacific Fishery Commission come to mind. But these are really limited efforts, in which vitally important areas of investigation have been left out, either because of limitations of funds, or because of limitations on the range of problems on which multilateral agreement could be obtained.

The problems associated with the definition of the aggregate productivity of living marine populations have usually been viewed in the setting of oceanography, broadly defined. A full appraisal of the productivity of any ecological unit in the sea obviously involves not only a massive study of the biological factors involved, but also of the elements of physical oceanography that lie behind the parameters of the equilibrium system comprising the exploited populations.

As an economist, however, I wonder if we might not be looking down the wrong end of the telescope. Ultimate understanding of the elements entering into the population dynamics of any exploited fishery population does require full knowledge of causal processes affecting recruitment, growth, and natural mortality, and the reaction of each function to changes in population density. This is almost identical with the problem faced by the economist in explaining the prices, outputs, and selling policies of—say—steel producers. In a literal sense these depend, to some extent, on the prices, output, and selling policies of every producer of every other product. For practical purposes, the steel executive must narrow this area of interdependence drastically before he can reduce his decision-making problems to manageable proportions. The number of variables that affect the prices of steel directly and significantly is small enough to permit development of operational firm policies.

In the same vein, the critical problem for the international fisheries is not to define how much might be learned from physical and biological oceanography with no restrictions on time, money, or scientific manpower. Rather, it is to

define how little we must know to establish with tolerable accuracy the dimensions of populations we wish to exploit and the alternative yields obtained with different levels and types of fishing effort. This is not to decry the urgent need for far larger national and international efforts in the field of oceanography. The urgency of our effort in space rests on intellectual and scientific gaps no more serious than those in the field of oceanography. But the problems of protection and maintenance of the resources of the sea have become so critical that we simply cannot wait for "adequate" background knowledge. We must undertake to parallel the general oceanographic effort with less grandiose and, in a scientific sense, much less satisfying programs designed to give us operational limits for fishery management within the fairly short period of time that remains before the situation gets completely out of hand.

Certainly this is nothing new. The halibut and salmon commissions in the Pacific Northwest, the Inter-American Tropical Tuna Commission, the whaling commission, and a host of individual scientists have defined both the methodology and the problems of setting tentative values on the variables in a dynamic model of an unexploited fishery. But they have dealt, for the most part, with the simplest kinds of cases, with relatively little overlapping of species, and with fairly limited variations in market preferences and optimal fishing techniques among participating nations. When the focus is shifted to the great trawling grounds of the northern hemisphere, the complications go up at an astonishing rate. In most cases the biological models have not been integrated with those elements of cost and price analysis required to define optimal fishing effort, and a bio-economic model becomes even less tractable than a purely physical one.

Nevertheless, the research job will not be made easier by sweeping it under the rug and forgetting it. Before sensible alternatives to the present unrestricted race can be presented for serious consideration, the dimensions of the resources available must be known with whatever degree of accuracy the techniques of marine science permit.

But this alone is clearly not enough. Results of the limited efforts at conservation of marine resources underline the necessity of framing regulatory programs in ways that permit allowable yields to be taken at or near the lowest possible cost and in ways that encourage rather than discourage the development of more efficient methods of harvesting and processing. To date, even conservation programs regarded as successful in a biological sense have tended to preserve or even accentuate the hunting aspects of fishing rather than moving toward controlled harvesting, the ultimate objective of an economically viable marine resource industry.

For each biological research program, then, there must be a corollary study of alternative productive techniques of the various nations involved and of the range of alternative fishing methods that might be acceptable to all, with some indication of the optimal solution—however difficult that might be to achieve politically. This involves two elements: first, an analysis of cost-yield relationships using various types of vessels and gear; secondly, analysis of the reaction of the fishing fleets to alternative methods of regulatory control. The second element, frequently neglected, accounts for many of the uneconomic aspects of otherwise successfully regulated fisheries.

Finally, we must take a long hard look at the entire fabric of international law as it applies to the exploitation of marine resources. I doubt that any fishery scientist, fishery economist, or industry representative would claim seriously that the "law of the sea," as it stands or as modified along lines

proposed by our own or other governments, comprises even remotely a framework that would permit economically sensible exploitation of internationally shared fisheries.

To the extent that international law deals specifically with fishery matters at all, it appears to rest on the historic concept of freedom of the seas, and thus on the long-abandoned thesis that resources of the sea are too abundant to be affected materially by the insignificant inroads of man's own predation. Subsequent modifications, involving extension of the rights of coastal states and extension of control over exploitable areas of the continental shelf, represent at most a very slight improvement. The effectiveness of the relatively small number of bilateral and multilateral treaties, the more promising avenue for modification of existing international legal doctrine, has been seriously handicapped by the insistence on a purely scientific approach to what must always be an economic as well as scientific program.

Fortunately, international law, perhaps more than any other area of legal doctrine, derives from social, political, and economic need; where developments in modern technology have completely bypassed previous precedent, it must literally be written anew. There exists a real opportunity to push the view that the law of the sea as applied to marine fisheries is something to be developed out of demonstrated scientific and economic need rather than by warping traditional (and essentially inapplicable) principles. To do so, however, requires more thorough documentation of the biological and economic requirements for rational exploitation than either fishery scientists or economists are prepared to put forward at the present time. We must, after all, have something to disagree about before negotiation can begin.

In each of the crucial areas of knowledge—the dynamic characteristics of exploited or exploitable fish populations; alternative fishing arrangements evaluated in economic terms; and alternative international legal arrangements that would accommodate an orderly solution—the theoretical issues are clear enough. The urgent need is for a series of detailed case studies involving actual fisheries, actual production alternatives, and actual proposals to the governments of participating nations on possible control programs. It might be wise to undertake such studies initially in areas where the problem of excessive exploitation by several nations is potential rather than immediate, and where the inevitable complications are at a minimum. The Gulf of Guinea and the east coast of South America are good examples of regions in which sensible ecological units can be defined; the fishery potential is great enough to warrant serious study; and development of the fisheries is at an early enough stage so that national and international positions have not hardened irrevocably. If sensible and scientifically buttressed results can be realized from studies in areas such as these, we might then be equipped to tackle the infinitely more arduous (and more important) conflicts, actual and potential, in North Atlantic, North Pacific, and Asian waters.

The stress on the term "area study" is deliberate. Many fishery scientists and administrators have pointed out the weaknesses of species-oriented research, development, and management programs. The weaknesses become even more evident if our perspectives are expanded to include maximum net economic yield as a major objective in such programs. It is rarely possible to make the management unit, the ecological unit of which the desired species are a part, and the technical unit (including all species exploited by the same fleets) coincide exactly. But the closer we come to regional programs that encompass

these three "dimensions," the greater the chances of reaching mutually acceptable agreements on the level of fishing effort and the techniques of regulation.

Ideally, the management or decision-making body would be an international corporation, private or para-statal, operating under international agreements that would permit it to develop optimal gear, techniques, and levels of fishing and to sell in whatever markets yield the best returns. Since this is clearly beyond the realm of possibility, the regional treaty seems to hold out the most promise as an administrative technique.

It is not visionary to argue that studies by qualified teams of biologists, economists, and international lawyers could produce plans for orderly development and control of fishing effort which, if not ideal from the standpoint of each present and prospective participant, would be demonstrably superior to the results that follow inevitably from completely unrestricted expansion of fishing capacity.

If the existing pattern of international fishing activity would remain roughly stable, the possibility of reaching mutually satisfactory agreements would be enhanced enormously. Unfortunately, many nations with urgent protein deficiency problems are not yet full participants in marine fishing activities. Whatever basis one chooses—economic, moral, or political—it is unlikely that these nations can or should be excluded from participation even in areas where resources are already being fully exploited. Some way must be found to permit the orderly entry of new countries, with full knowledge that this may require some curtailment of the catch of established fishing nations. Again, the only possible basis for reaching such agreements must lie in the comparison of these somewhat unpalatable arrangements with the even less palatable outcome if the new entrants simply force their way into existing fisheries without regard to the yield capacity of the basic resources. This comparison cannot be made in abstract terms. It must be set forth in terms of the production limits of the actual species involved, the impact of the actual types of vessels and gear employed in the fishery, and the political and economic structure of participating nations.

An offshoot of this kind of investigation might very well be the development of techniques under which the participation rights of underdeveloped fishing nations could be protected while permitting early development of underexploited resources by nations with more advanced technologies. In effect this would permit the most rapid possible expansion of protein supplies from the sea without prejudicing the ultimate right and ability of coastal states to engage in the fishery as their capital and technological knowledge accumulate. There is some precedent for this kind of development in the more or less formal agreements that have been entered into by fishery firms of major fishing nations with governments in the less developed countries. What is needed, basically, is to fit such agreements into an orderly overall plan for limitation of fishing effort to levels compatible with the productivity of the stocks available.

Looking still further into the future, the development of regional fishery agreements along the lines outlined above should make it possible to limit or eliminate some of the more frustrating inefficiencies inherent in the present geographic distribution of fishing effort. It is literally impossible for either private or state enterprises to develop a sensible long-term investment program in high seas fishing fleets when the productivity of the alternative grounds available to them cannot be predicted with any degree of accuracy. All they can be sure of is that fishing effort is expanding rapidly and that the yield-effort

relationship on readily available grounds will be beaten down at an increasing rate. Fishing gear and vessels must therefore be designed with an eye to the necessity of periodic movement as depletion proceeds on its inexorable course. At best this calls for compromises in both design and operation that levy a heavy toll in terms of efficiency.

If one could relapse into dreaming rather than forecasting, one might even consider the possibility of substantial relaxation of restrictions on trade in fishery products and on the use of foreign port facilities to minimize the total cost of transportation and marketing. If the competitive national character of the sea fisheries could be tempered by orderly multi-lateral agreement, it would be far easier to work out sensible arrangements for the location of processing and maintenance facilities, and thus to escape the absurd dilemma under which each modern fishing nation develops prohibitively expensive long-range gear to fish on other doorsteps because all the others are on one's own. For any given fishery, with given assumptions as to markets for final products, it should not be overly difficult to program, with modern computer techniques, a range of optimal fishing and processing locations and types of investment. Under present conditions it is manifestly impossible to undertake this kind of analysis of optimal investment level and location, since the basic resources are constantly subject to influences beyond the control of the individual firm or the individual nation.

In conclusion, let me revert again to the urgent need for positive and immediate action. The past demonstrates all too well that once doctrine and agreement are hardened into the fabric of international law, they are virtually impossible to dislodge. Something must be done fairly quickly about the serious conflicts of interest among fishing nations, both old and new. The real danger is not that we do nothing, but rather that we do something on the basis of completely inadequate scientific and economic analysis, and that we shall have to live with the unsatisfactory results for an indefinite period of time.

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