Options for Fisheries Management

International Management of Tuna, Porpoise, and Billfish. Biological, Legal, and Political Aspects. JAMES JOSEPH and JOSEPH W. GREENOUGH. University of Washington Press, Seattle, 1979. xvi, 254 pp., illus. $20.

The search in recent years for more logical methods of managing fisheries has seemed to me to evade the fundamental question of whether or not the real complexity of environment-fish-fishermen-market relations can be reordered into a logical and stable pattern; except in special cases, I personally doubt this can be done within the terms of economic theory. Joseph and Greenough's new examination of the management options facing the tropical tuna fishery seems to support this view; perhaps this fishery is an extreme example of the way in which a multitude of ecological, economic, and political factors have to be balanced in order to achieve rational management, but it is by no means unique.

Tuna are large predatory fish of warm oceanic waters, within which they perform regular annual migrations of transoceanic magnitude, even trans-Pacific in some species, passing through the 200-mile exclusive economic zones (EEZ's) of many countries. The geographical features of relevance to them are themselves mobile, being the current and frontal systems of the open oceans; the exact locations of their seasonal centers of abundance thus vary from year to year, sometimes over great distances. Tuna aggregate below large floating objects and school rather regularly in association with porpoises, for reasons that are not wholly understood. Billfish have most of the attributes of tuna, save that of schooling; they are solitary high-level predators of the tropical oceans.

Tuna are caught mainly by very large purse seiners and longliners, and to a lesser extent by chumming with live bait by pole-and-line boats; billfish are caught only by longline. The bulk of the catch of both groups of fish is taken by fleets from industrialized nations—the United States, Japan, Spain, France—and largely off the coasts of developing countries of the Third World. In a single trip, a 1000-ton seiner may gross half a million dollars and may be required to buy single-trip licenses costing up to $50,000 each for fishing in foreign EEZ's. Their fishing activities in any year may encompass three oceans and many EEZ's and are regulated by bilateral treaties, four fishery commissions, and lots of plain old horse dealing. Flag changing, to avoid difficult national regulation, is commonplace, as is foreign ownership of vessels operating from Third World ports.

Joseph and Greenough review all this for us in a scholarly manner and from the viewpoint of the problems facing the management of the fishery in the eastern tropical Pacific under the egis of the Inter-American Tropical Tuna Commission (IATTC); this differs from the Atlantic commission (the International Commission for the Conservation of Atlantic Tunas, ICCAT) in having a staff of full-time scientists who gather fishery data in real time, perform ecological research, and give management advice to the governments represented on the commission. In the early years of IATTC it regulated a U.S.-dominated fishery in a large area in the eastern Pacific, excluding the territorial waters of Central America, then relatively narrow. As the U.S. fleet altered methods and became highly profitable, its operations came to be a factor in the declaration of wider seas of national jurisdiction, and a greater share of the annual quota came to be demanded for the smaller vessels of the Latin American nations. The imposition of quotas and the rapid fleet buildup led to a situation in which the fishery was closed progressively earlier each year, until U.S. seiners managed to get in only about a single trip each before closure in February. Thereafter the fleet moved, officially, beyond the regulated area and fished as far afield as the western Pacific and the Gulf of Guinea.

The core of Joseph and Greenough's book is a discussion of the likely consequences of various management regimes in this fishery and the way in which the quite different interests of the have and have-not nations, the fishing and the "resource-adjacent" nations (RAN), might be reconciled. Their arguments are supported by very good data tabulations, and their choice of a partial allocation system is certainly, on the face of it, the most likely candidate for success. They also address the question of what kind of organization would be required for effective management of the fishery.

From considering the continuation of the present system, with the great difficulties it imposes on the major fishing nations, who see their allocations a dwindling part of the whole allocation, Joseph and Greenough pass to a discussion of new scenarios for the future. The primitive control by RAN's of their own EEZ's would lead them to maximize their own catches or their take from license fees, either way leading to inevitable fishing beyond what the stock can sustain and to the maximization by fishing nations of their take in international waters, also to the detriment of the stocks. Regional coalitions of RAN's and non-RAN's would be another recipe for disaster resulting in maximization of catch independently within and outside the EEZ's.

The authors suggest that a complex system they term PAQ, or partially allocated quotas with open access and participant fees, might be viable. Under this system a regulatory agency would set the overall quota, collect fees from participants (and redistribute them to RAN's), enforce its regulations, and allocate an agreed part of the total quota to RAN's, leaving the remainder free for all paying participants in the fishery. This suggestion leads the authors on to their design for the international regulatory body: it should be international and be responsible for tuna fisheries wherever they are, and it should have its own scientific, management, and regulatory staff like the present IATTC. Perhaps I am unduly cynical, but this reads too much like Utopia for me to take very seriously; a gradualist approach would seem to be more realistic, though how the commonsensical avenue taken by IATTC could be induced to spill over into the Atlantic commission is hard to visualize.

Joseph and Greenough are fairly frank concerning the national interests of the countries likely to be involved and of the various segments of the industry, but of course they cannot cover all the Byzantine complexities that drive the real world around; apart from run-of-the-mill political enmity and amity between participating nations (which are not hard to demonstrate within the IATTC area) there are also the totally unpredictable rocks that lie along the way: who could have guessed that the American public would react so strongly to the killing of porpoises associated with tuna that the Marine Mammal Act would include terms so strong as to threaten the whole viability of the U.S. fishery? Can Flipper really be integrated into politicoeconomic predictions? As well as a President Somoza?

The reader will welcome this thought-provoking and competent text, which will serve, as well, as a source for information on which to base discussion of how we should manage our fisheries in the future but may be forgiven if he or she is skeptical of a future that looks much like the scenario of Joseph and Greenough. Short of a New Economic Order, and a comprehensive treaty on

the Law of the Sea that might sweep away all current fishery commissions to bring resource management under the umbrella of the International Authority for the oceans, all we can probably look forward to is disarray and control by unplanned economic and financial reality. And therein lies the best justification of those who continue to hope for a logical outcome for the current series of conferences on the Law of the Sea so painfully dragging on.

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Ocean Wave Power

Energy from the Waves. The First-Ever Book on a Revolution in Technology. DAVID ROSS. Pergamon, New York, 1979. xvi, 122 pp., illus. Cloth, $15; paper, $7.50. Pergamon International Library.

Subtitled "the first-ever book on a revolution in technology," this is not a technical book but a rather breathless, journalistic account of what may ultimately prove to be a useful new source of electrical energy, at least in Britain. The great storm systems of the North Atlantic generally move to the east, so that the seas to the west and north of Scotland, in the North Sea, and in the Bay of Biscay are chronically rough. It has been a dream for generations to harness the power of those great ocean rollers, but only recently have devices been invented that are even remotely practical. The technical difficulties are formidable. The devices must be capable of surviving in storms with waves as high as 20 meters (the height of a six-story building); they must also extract useful power at a reasonable cost from much milder seas and be dispersed sufficiently widely that when the sea is calm in one place there is reasonable assurance of activity in another.

The pioneers in efforts to harness ocean wave energy have mainly been British. Ross's account is derived largely from his interviews with the oceanographers of the Institute of Oceanographic Sciences who told him about the waves; with the inventors, such as Cottrell, Salter, and Bott and Russell, each of whom has a rather different technique for capturing the energy, and with the civil servants of the Department of Energy or the Department of Trade and Industry who support (or don't support) the various endeavors. Cottrell has his articulated raft, which bends in response to the waves, power being extracted by the relative motion. Salter's "ducks," curiously shaped floating tanks strung in a line, nod up and down in the waves and absorb the incident energy flux very efficiently (up to 90 percent). Bott and Russell have designed catching basins, to be constructed at or near a shoreline, into which water is trapped by large nonreturn valves and then passed through turbines. A Japanese device, invented by Masuda, is already powering navigation buoys—can it be improved and scaled up from an output of 60 watts to one in the megawatt range?

The style of the book is informal (plenty of conversation and direct quotations), and Ross does not hesitate to inject his own opinions about the power of the coal and nuclear lobbies or to expose the rivalry, sometimes squabbling, among the participants. There are a few minor technical inaccuracies. The author is sometimes rather uncritical in his advocacy and perhaps less mindful of the difficulties than some of those cautious civil servants, but no matter; the book is a "good read" about an interesting technical development and is adequately illustrated.

A postscript: What would ocean wave power do for the United States? On a national scale, probably not very much. Our seas (except in some parts along the West Coast) are generally calmer than those of Britain, and for us ocean thermal energy conversion or direct solar power from widely dispersed, small sources may well be cheaper and more reliable. Nevertheless, we should keep watching with interest.

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A Continental Rift

Rio Grande Rift. Tectonics and Magmatism. Papers from a symposium, Santa Fe, N.M., Oct. 1978. ROBERT E. RIECKER, Ed. American Geophysical Union, Washington, D.C., 1979. x, 438 pp., illus. $16.

Rifts are long depressions on the earth's surface over places where the lithosphere has ruptured in extension. Most rifts are in oceans, but there are a few well-known active rift systems within continents. The East African, Rhine, and Baikal rifts have been the best described of continental systems, and the Rio Grande rift, a 1000-kilometer-long structure crossing New Mexico and extending into Colorado, has been something of a Cinderella by comparison. As C. E. Chapin explains in his foreword, sophisticated work on the rift dates back more than 40 years to the time of Kirk Bryan, although, as is often the case in geological research, local results have been poorly integrated into general syntheses. Largely with a view to making up for previous neglect, an international symposium on the Rio Grande rift was held in 1978. The 26 papers in this volume were selected from papers that were presented at the symposium. As a result of the symposium the Rio Grande rift has become one of the best-described of continental rifts.

For me there are two primary questions in rift studies: What made the rift system form where it did? and How has the system evolved? G. P. Eaton's paper is the main response in the book to the first question. Rifts are known to form in a variety of extensional regimes, and Eaton shows that extension behind a volcanic arc dominated the Southwest about 30 million years ago when the Rio Grande system was initiated. As is often the case, the precise location appears to be controlled by crustal inhomogeneity. Later, the Rio Grande system became closely linked with the neighboring and much more extensive Basin and Range province. Most papers in the volume concern the question of how the rift system has evolved. An answer to this question requires the integration of geophysical, geochemical, structural, stratigraphic, and petrologic information. It is in the successful exposition of studies of all these aspects of rifts that *Rio Grande Rift* is outstanding.

The papers in the book are likely to become standards against which future rift studies can be measured. Balance among the various aspects of rift study has not been attained, but this is not a reflection on the quality of research. Volcanic rocks are varied and accessible in the Rio Grande system, but the stratigraphy of the nonmarine sediments of the rift is hard to synthesize and commercial seismic results relevant to both stratigraphic and structural studies are not available at present. Altogether, the book is a successful presentation of up-to-date information on the Rio Grande rift. The gaps in coverage may be thought of as indicating the prime research targets for the next decade.

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