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Ocean: Frontier for men of vision

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THE OCEAN: FRONTIER FOR MEN OF VISION

By Marshall D. Shulman

The sea has always excited man's imagination. The smell of the sea evokes adventure. Its restless energy has the power to soothe or to terrify. And somewhere in its murky depths are clues to the great mysteries of the origins of the planet and of man himself.

But now, quite suddenly as time is measured, many of the things man has imagined himself doing in and with the sea are becoming practical possibilities —to draw food and energy from it in great abundance, to live upon the ocean floor, to extract from it countless resources and medicines, to control its moods and even to unravel its mysteries. Yesterday's science fiction has become today's reality, and is becoming tomorrow's business opportunity. No one of us will be untouched by modern man's dramatic return to the sea. For each of us—scientist, engineer, businessman, government official, sportsman—the ocean has become a new frontier for men of vision.

We all shall have to learn to look at the sea with fresh imagination—and especially those of us whose task is to translate technology's possibilities into practical operations of industry and commerce. Economic feasibility may be a more crucial limiting factor than technology, and it will be those who know how to bring together investment, production methods, marketing and technical skills who will determine how fast we shall move toward the new uses of the sea. Forward-looking accountants who have studied ocean problems will clearly play an important role in analyzing the costs involved in these developments.

The very nature of the ocean—its size, its involvement of other countries, its complex scientific, engineering and defense aspects—obliges us to devise new patterns of state and federal government relations with the private sector, and new international arrangements that may involve regulatory, licensing and taxing powers. It also poses new responsibilities because of the special hazards it represents. Three quarters of the earth is covered by water, and as man pushes outward from his crowded continents seeking new sources of food, energy and living space, the haunting question is whether he will litter the seas as he has done the earth until finally the entire planet becomes unfit for human life, and whether he will make of the seas a battleground instead of a beneficence. Those who help to develop the use of the ocean resources will be severely judged if they do not match inventiveness with responsibility. The new ocean frontier by its nature imposes new ways of thinking upon us, for it is a resource we hold in common. We are all custodians of the sea, for ourselves and each other and for the generations that will follow.

During the coming months, the most important basis for public discussion of the issues raised by ocean development is likely to be a report recently issued by the Commission on Marine Science, Engineering and Resources, authorized by an act of Congress in 1966. This report, prepared under the chairmanship of Dr. Julius A. Stratton, chairman of the Ford Foundation and former President of the Massachusetts Institute of Technology, is destined to become a classic model of how a nation can seek to achieve an overview of complex problems that cut across many sectors of public and private life, and to encourage anticipatory thinking about what needs to be done over an entire decade. Accountants, management advisory men and tax specialists whose clients may be dealing with the development of sea resources will find this report valuable background reading.

One of the seven panels which worked under the Commission devoted itself to relations between government and private industry. The main burden of its recommendations is that farsighted government policies can create a favorable climate in which "industry would be particularly encouraged to generate additional ideas, methods and risk capital for the detailed surveying, delineating, producing and marketing of marine resources." Recognizing that the government would have to move forward to clarify national regulatory policies and international arrangements governing ocean activities, the Commission argued that predictability on these scores would encourage an adequate supply of private investment capital. It recommended, therefore, that direct governmental subsidies were less needed to encourage industry to generate capital for marine investments than to provide research, exploration, basic technology and supporting services.

This spelling out the implications of a mixed economy for a developing technological field may have far-reaching importance in many other aspects of our economic life. Many areas of contention between competing interest groups and between public and private considerations will remain as these

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principles are applied in practice. But the effort to articulate an approach that preserves the dynamism and initiative of private enterprise within a framework of public responsibility and national priorities represents a contribution to the evolution of the American system itself as it moves into a period of advancing technology.

Of the $2 billion worth of resources taken by United States firms from the continental shelf and adjacent waters in 1967, according to the Commission's estimate, about half was represented by petroleum. Starting from scratch just 20 years ago, the petroleum industry in the United States now derives 1¼ million barrels a day from offshore production, or about 15 per cent of the total U.S. production. It is anticipated that within a decade one-third of the total world oil production will come from offshore sources.

The technical obstacles that have been overcome in the development of this industry have been made possible by extraordinary cooperation between the petroleum industry, the Navy, commercial research organizations, universities and other scientific institutions. As of now, most drilling is done from platforms extending down to depths of 340 feet of water. Advanced designs are now on hand for platforms capable of operating in 600 feet of water, and exploratory wells have been drilled 1,300 feet below the surface of the ocean. The search for oil in the deep ocean has led to the development of sophisticated floating drilling vessels using automatic drilling and dynamic positioning equipment. Not long ago, the *Glomar Challenger,* a vessel in the Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES) program, brought up test cores from 12-000 feet below the Gulf of Mexico containing evidence of oil deposits. (This discovery was incidental to the main mission of the *Glomar Challenger,* which was to take mid-Atlantic core samples to test the hypothesis that the sea floors have been spreading outward from the middle of the Atlantic, where, it is thought, the continents of Africa and Latin America once fitted together. Similar tests were made in the Pacific.)

The exploitation of oil from the deep ocean will require further advances in the technology of submerged systems, but the present importance of this exploration is to indicate the availability of large reserves that may be of future significance. Among difficult regulatory problems are the balancing of incentives to encourage exploration for offshore reserves against the desirability of protecting those reserves from too rapid exploitation; the granting of leases for deep ocean exploration as against the desirability of some international regime for deep ocean resources; and, of course, the prevention of such destructive leaks as have occurred off the coast of Santa Barbara. Accountants will obviously be deeply concerned with the analysis of increases in the costs of doing business as a result of the steps needed to protect our environment.

Interest in offshore sources of natural gas has been increasing as domestic reserves have been declining. Last year, almost 2½ trillion cubic feet of natural gas came from offshore production, and this supply has been growing at a rate of approximately 20 per cent a year. After the gas is found and produced by the petroleum companies, its interstate transportation is subject to regulation by the Federal Power Commission, and the question of what guidelines should govern this regulation has been subject to disagreement between the government and gas producers and distributors.

Of special interest here is the accounting problem of how costs of research on transmission technology are to be capitalized. While successful research can generally be capitalized by the transmission industry, research that is unsuccessful in outcome, or that does not yield identifiable improvements in transmission methods, may be disallowed. Some companies hold that this inconsistency in accounting practices has held back the search for innovations which could reduce the cost of gas transmission. The Commission on Marine Sciences has therefore recommended that the Federal Power Commission review its accounting regulations relating to research and development, to determine whether they are consistent with the legitimate need of the gas transmission industry for clear and realistic guidelines.

Although the sea is rich in minerals, only a few have so far proved worth the cost of extraction. Bromine (used in gasoline anti-knock compounds), magnesium (for metal alloys and medicines), 10 per cent of our sulphur and one-third of our salt are among the most common minerals now being obtained profitably from the ocean. Tin is mined off the waters of Southeast Asia and diamonds are extracted from the gravel of the sea bottom off South Africa. Although phosphorites (useful for fertilizers), nickel, cobalt and copper are known to exist in abundance on the ocean floor, these do not yet seem likely to be commercially attractive in the near future. Recently a commercial attempt to mine manganese nodules from the ocean floor has been begun. Since the United States is dependent on foreign sources for many of these minerals, it may be that strategic considerations will lead the government to encourage the development of ocean mining by granting economic incentives and by supporting technological research on marine mineral exploration and recovery. Such exploration devices as submarine crawlers and submarine dredges would be required, as well as engineering advances to make possible the raising of minerals from the deep ocean floor—but the lesson of the last two decades of ocean

technology and engineering has been that almost anything we wish to do can be done, if we are willing to apply sufficient resources to the task.

Whether we can face with equal confidence the international problems involved is doubtful, for nationalism and the tensions between industrialized and developing countries create a prickly set of issues. The Marine Sciences Commission has included among its recommendations a plea for the United States to take the lead in proposing a new international legal and political framework to govern the exploration and exploitation of the mineral resources underlying the deep seas. Some international body is needed, the Commission argues, to register claims, arbitrate disputes, promulgate standards on conservation and pollution, inspect operations and collect fees and royalties. The funds collected could be used for marine scientific research, food-from-the-sea programs, and other international development activities. Sentiment runs strong among the developing countries in the United Nations for some form of international regime governing the resources of the deep ocean floor.

Among the many other potentialities of the sea which excite the imagination, some involve the further extension of familiar ocean activities with the assistance of new technological applications. The shipping industry is a good example, where such developments as jumbo ships, the use of containers, automated controls, satellite navigational systems, innovations in ship construction all offer economic possibilities for an industry that has been declining. Commercial fishing also falls in this category, although other countries have been more alert than the United States to the possible applications of new technology and equipment in this field. Experiments in aquaculture and in the production of fish protein concentrate as food for livestock and a protein additive for human consumption may help to meet one of the most serious problems facing the world today—the growing imbalance between population and food supply. The application of new technological advances to defense activities on and under the ocean would be an important subject in itself, but the United States is faced here with the same delicate judgment that confronts it in other weapons fields—how to maintain a stable balance in a rapidly changing military environment without encouraging an interacting spiral of weapons systems that will in the end reduce our national security.

Unlike the activities just mentioned, which involve an extension of familiar enterprises through the application of new techniques, many new kinds of activities have been attracting the attention of men of vision, as technological possibilities open almost limitless vistas to the practical imagination. The harvesting of fresh water from the ocean by desalination plants is becoming rapidly more interesting economically. In conjunction with this, the development of dual-purpose complexes to produce both electric power and water creates the exciting possibility of making productive and attractive land that is now arid and barren. Other research activities are centered on prolonged operations in deep water, which would not only make possible the deep-sea rescue operations which are so urgently needed, but might lead to laboratories, refineries, mining operations and even prolonged human habitation on the sea bottom. The drug industry has only begun to conduct research on the new antibiotic and pain-relieving pharmaceuticals which now appear to be available in the sea.

In some ways the most interesting development along these lines has been the growing nexus between oceanography and space research, for it turns out that man's venture into these two new environments has led to many common and interacting problems. Many companies that have been most active in aerospace industry have found that their experience with new materials, structures and life-support mechanisms are also applicable to underwater activities. Space satellites are already in use in ocean navigation, and photographic reconnaissance from space satellites, using infra-red as well as conventional photography, makes it possible for oceanographers to work from an overview of entire oceans, as well as to study ocean depths and currents. Together, space and oceanographic scientists are making striking progress in weather monitoring and prediction which can save many lives in the near future. Over the longer run, it may lead to man's control of the weather. Many of these activities which depend upon international cooperation will receive additional stimulus during the 1970s, which have been proposed by the United States as the International Decade of Ocean Exploration.

In the end, however, accountants and other men of business who are thoughtful as well as visionary will surely be deeply concerned by the question whether these new activities in ocean environment will improve or worsen conditions of life. We have been discovering that all change is not necessarily progress. If our inventiveness is to add to health and happiness instead of contamination and destruction, we shall need not only vision but wisdom as well. □

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