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Is the Gulf of Mexico Ready for Deep-Ocean Environmental Regulation?

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hundreds of people employed in the support industries are considered along with their families; all businesses in the communities would suffer if these individuals were not employed and living in the community. Thus, the loss directly and indirectly related to the absence of the artificial reef system offshore from Alabama quickly becomes virtually inestimable.

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IS THE GULF OF MEXICO READY FOR DEEP-OCEAN ENVIRONMENTAL REGULATION?—In a recent critical examination of how well deep-sea diversity hypotheses serve the needs of ocean environmental management (Carney, 1997), it was pointed out that many exploitation plans proposed one and two decades ago have fizzled out. Nodules are not worth mining, waste dumping is effectively banned, and ecologically ill-advised deepsea fisheries may be short lived. For large areas of the World Ocean it may be reasonable to assume that there are few new environmental threats to the deep ocean. I would like to argue that this is decidedly not the case for the Gulf of Mexico.

The Gulf of Mexico is the only region of the U.S. Exclusive Economic Zone (EEZ) undergoing actual deep exploitation at this time, and this exploitation is progressing with only a minimal knowledge base to support environmental regulation. Such a knowledge base has not been developed because during the past decade there has been a loss of interest in the deep sea on the part of various federal agencies. When Congress decreed that high-level radioactive waste must be disposed of on land, DOE (Department of Energy) research into the "ocean option" came to a sudden halt. When the time came for renewal of the Deep Seabed Hard Minerals Act, NOAA (National Oceanic and Atmospheric Administration) recognized the near demise of the once exciting deep manganese nodule mining industry and shut down its joint U.S.–Russian research program. And, as Congress established and amended laws that implemented the restrictions on ocean dumping of the London Convention (Convention on the Prevention of Marine Pollution from Dumping of Wastes and Other Matter), NOAA and the Environmental Protection Agency (EPA) let deep-water projects drop in priority.

In effect, much deep-ocean research outside of the Gulf of Mexico was terminated prior to completion for policy or economic reasons. Most of the terminated research was research and development related, and it is hard to see how the failure to develop uneconomic or banned technologies is much of a loss. However, considerable effort was being extended in anticipation of deep-ocean environmental regulation. Such work not only took the traditional faunal survey approach but also tried to incorporate ecological processes. Thus, the business of developing a science-based strategy for deep-ocean environmental regulation was brought to a premature end.

Is Deep Oil Development an Environmental Threat?

Offshore oil and gas development on the continental shelf is an accepted fact of ocean utilization off the coasts of all Gulf states except Florida. Like shelf-depth development, Minerals Management Service (MMS) and EPA exert regulatory authority in deep water. Is this a major environmental concern? It is easy to accept the argument that it is not. Indeed, the best studies in shallow water have found only local chronic effects (Peterson et al., 1996), and larger-scale impacts seem to be lost in the noise of naturally fluctuating marine populations (Carney, 1987). However, impact due to shelf depth development has been kept to such a minimal and acceptable level due to informed regulation.

The regulations that have assured an acceptable level of impact can be considered informed regulation. These regulatory strategies

have been successful because they are based upon a substantial level of understanding of the Gulf of Mexico continental shelf ecosystem. Some of this understanding was gained here in the Gulf with considerable MMS support. However, most really came from decades of basic research at Gulf coast institutions. This general level of scientific information includes the identification of species, the basic ecological concepts of ecosystem function, and the regional details of ecosystem structure.

It is my worry that industrial development in the deep Gulf of Mexico is proceeding at a rate far greater than our accumulation of understanding. Industry, to a large extent, and regulators to a lesser extent, may be failing to realize how important to successful regulation basic ecological understanding is. Regional environmental studies in shallow water contribute to successful regulation because so much is already known, not because a multimillion dollar survey is carried out. Similar or even more extensive studies in deep water will contribute far less because there is so little basic understanding.

The Pending Threat, Waste Dumping Sites

Oil and gas development may actually be one of the most benign uses of the deep sea; waste dumping is not a dead issue. It is not strictly true that the London Convention bans ocean dumping. The London Convention went into effect in 1975. Its conditions have been reinforced in the U.S. in clauses of various legislation, especially the Marine Protection, Research, and Sanctuaries Act. These conventions and laws allow certain dumping with nationally granted permits and have exceptions for even the most hazardous of materials under crisis conditions. Should a government agency or industry wish to resume waste disposal in the sea and is determined to pursue exceptions under the rules, ocean dumping could be resumed. Indeed, there is a persistent interest in resumption of ocean disposal at a time when the waste problem becomes critical. Unfortunately, regulators will face those crisis permits at a time too late for environmental study.

The Gulf's location and industrial environment seemingly make it an attractive candidate for advocates of deep ocean disposal. Via the Mississippi River transportation corridor, wastes could be moved in bulk at relatively low expense. The Texas and Louisiana port regions have one of the highest concentrations of petrochemical industry in the world. This industry faces a progressive termination of traditional discharge routes into the air, water, and subsurface geological structures. There is also great economic incentive for the offshore industry to abandon deep oil and gas structures once reservoirs have been depleted. A quick check of any Gulf navigation chart reveals marked disused disposal sites on the continental slope convenient to Corpus Christi, Galveston, New Orleans, Pensacola, and Tampa. In addition, three larger areas are designated deeper at or near the slope base. These include an organochloride disposal site in the western Gulf, possibly associated with incineration and two explosives sites in the eastern Gulf. All such sites are candidates for reactivation suddenly, with minimal study.

What is Known about the Deep Gulf?

There is not a whole lot of comprehensive knowledge about deep-sea ecology in any part of the ocean, and speculation usually exceeds evidence. Our most critical information shortage in the Gulf of Mexico concerns function; this appears to be an odd deep-sea region. It is entirely continental margin, yet seems to be as oligotrophic in the western half as mid-ocean regions (Rowe and Menzel, 1971; Rowe et al., 1974, 1994). Being silled, it is unstratified below 1,600 m, but oxygen levels indicate it is very well mixed and must turnover far faster than larger ocean basins. It is dotted with deep-sea special habitats in the form seeps of many kinds, brine lakes, carbonate banks, submarine canyons, knolls, and braided abyssal channels.

Fortunately, our ignorance is not complete. In order of decreasing evidence, we know the larger fauna of much of the deep soft bottom, the fauna of a limited number of chemosynthetic sites, and the smaller fauna of soft bottom. The relatively high level of faunal information is due to shelf-depth fishery surveys in the 1950s by what is now the Southeast Fisheries Center at Pascagoula, MS (Bullis and Thompson, 1965). Trawl surveying down the slope and on to the abyssal plain was carried out by Willis Pequegnat at Texas A&M for a decade (Pequegnat and Chace, 1970; Pequegnat, 1983), producing a relatively comprehensive listing of megafauna. These trawl surveys were complimented by macrofauna sampling under MMS support in 1983–85 restricted to the northern Gulf (Pequegnat et al., 1990).

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Seeking A Solution

It is quite hard to propose a solution. The information gaps are large and the ecological knowledge base about the deep Gulf is needed now, not 20 yr in the future. Therefore, we cannot rely upon the traditional method of waiting for some mission agency to devote adequate funds. It has to be seriously questioned if NOAA, EPA, and DOE are any longer capable of carrying out effective deep studies. If they are, they would surely continue their tradition or carrying out studies in the wrong place. MMS has done an admirable job of dealing with oil and gas issues, but lacks the breadth of focus and the resources to meet all information needs.

When Congress passed the Deep-Water Royalties Relief Act, which encouraged deep drilling by reducing royalties on the produced oil, a serious omission was made. No provision was made for the research badly needed to provide adequate regulation.

Perhaps then, it is not too late to correct this error. The cost of deep studies in the Gulf of Mexico should be shared between the land owners (the citizens of the U.S.) and the land developers (oil and gas industry). Tax incentives could be given to industry to contribute to deep research or a modest dedicated royalty applied. Such funds could then be directed to support of a federally chartered, but independent, Deep Gulf Commission. Such a commission would draw from regional and international pools of expertise to carry out the necessary research.

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