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9. ABSTRACT

The pressure to develop lagoons for fish and shellfish production has increased dramatically in the past five years. The number of schemes for lagoon development and management also has grown, ranging from elaborate water control systems, including dams and diversion canals for fresh water with sea gates to hold back the ocean, to simple gates to prevent fish from escaping once they have entered. Lagoons undoubtedly will be exploited and managed even more intensively. Thus, a strong research base is necessary to avoid ecologically and socially destructive practices at worst and to promote national development schemes that fit broad biological, economic, and social contexts.

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A Development Proposal for Lagoons

by Harlan C. Lampe, professor of resource economics

As many stocks of fish in the open ocean have passed or are approaching their maximum yields, our attention has been turned to the culture of fish. Among the environments that immediately suggest themselves to us for management are brackish water lagoons. These lagoons are found throughout the world — central and eastern South America, the east and Gulf coasts of the United States, the west coast of Africa, Southeast Asia and Indonesia all have coastal zones with extensive lagoons. In some instances the lagoons are being exploited and even managed in crude ways by the people who live on their shores.

Because of the pressure on the oceans' resources and the nutritional requirements of the people in poorer areas of the world, the less developed countries (along with well de-

veloped ones) are increasingly looking to lagoons to provide high protein food for hungry people. The pressure to develop lagoons for fish and shellfish production has increased dramatically in the past five years. The number of schemes for lagoon development and management has also grown at an extraordinary rate. These schemes range from the elaborate water control systems, including dams and diversion canals for fresh water with sea gates to hold back the ocean, to simple gates to prevent fish from escaping once they have entered.

The clear interest in the first is to exercise extensive control over the environment to enhance productivity and in the other simply to use the lagoon as a trap.

Unfortunately, the lagoon as an environ-

ment is not completely understood nor have the ecosystems in lagoons received adequate attention, although substantial and effective work has been done on the east and Gulf coasts. Hence, the consequences of environmental modification are poorly understood.

Mexico, for example, has about 3.75 million acres of lagoons on both the west and east coasts. Mexico is, moreover, a major shrimp producer. It supplies the United States with over 70 million pounds of shrimp a year, and shrimp consumption in Mexico is increasing. It is not surprising that Mexico should look to her lagoons, where many shrimp species spend part of their life cycle, as a possible source of increased production. In fact, major proposals for development have been formulated. The full implications for the environment have yet to be assessed.

The lagoon environment and ecosystem is not limited, however, to the water and the plants and animals in it. The environment includes the men, women, and children associated with the lagoons. Families and communities depend upon lagoons for a livelihood and have developed complex economic and social institutions to permit their survival in the environment.

Lagoon management is too often viewed in a simply technological framework where certain inputs and controls will produce increased output, setting aside the long-run environmental implications for the moment. The implication is that if the money benefits exceed the money costs then that form of management will lead to a gain for society. This point of view is certainly uncomplicated. Unfortunately, in the less developed areas of the world as well as developed areas, the situation is not that simple.

Let us consider, for instance, the need to develop the skills of workers in the coastal community. It is not enough simply to promote the skills necessary to feed and harvest the products of the lagoon. Nor is it sufficient to develop technical business management skills. It is also essential to develop skills for the management of the community as the economy changes in size and structure with a new technology and new industry. It may even be necessary to be prepared for changes in family organization and customs as working patterns change.

Lagoon management may thus affect not only the lagoon environment, but the entire community development and may tax the

capacity of the community to change to meet the new pressures placed upon it, to take the economic benefits and evolve satisfying social and political institutions.

The research activity, thus, cannot focus on the lagoon ecosystem as conventionally viewed, but must examine the needs, aspirations, abilities, and activities of the people concerned.

To meet the nutritional needs of many countries in the world, lagoons will without doubt be more intensively exploited and managed. To prepare for these developments a strong research base is essential to avoid ecologically and socially destructive practices at worst and to promote rational development schemes that fit broad biological, economic, and social contexts.

Each specialist — the hydraulic engineer, the ecologist, the fisheries biologist, the economist and the sociologist — cannot work alone. Each must work with his fellows toward the program goal — to provide the bases for a rational development program.

To test such a coordinated approach to lagoon development, a proposal for the creation of the first Institute for Lagoon Studies is now being planned. This institute could operate in Mexico and bring together scientists from the government of Mexico, several universities in Mexico, the Food and Agriculture Organization (FAO) of the United Nations and the University of Rhode Island. Under the direction of Geoffrey L. Kesteven the FAO/UNDP project in Mexico has laid the groundwork for such research.

The institute would conduct its work on a major lagoon in Mexico. While this would clearly provide a great deal of information about one lagoon, one may ask whether this information could be applied to lagoons in other parts of the world. Some of the results will undoubtedly have general application and others will not. But the research will demonstrate whether or not scientists from several disciplines working together can develop a systematic approach to lagoon studies and a framework for future development of lagoons.

Development of these rich resources is sure to take place and, if this approach is not attempted, the world's lagoons may be developed in the same appalling ways that we have mismanaged our lakes, streams and estuaries.