from ENVIRONMENT 22(1): 25-42, January/February, 1980.

THE HUMAN COSTS OF DEVELOPMENT

BY JAMES RUSSELL McGOODWIN

ANTICIPATING THE CONCLUSION of the Third United Nations Conference on the Law of the Sea (UNCLOS III) in 1975, 80 coastal nations extended their jurisdictional claims over ocean economic resources to 200 nautical miles from their shores. Most of these countries are enthusiastically promoting new maritime developments, and in less developed countries (LDCs) the mood seems particularly bullish. Many of these nations—struggling with domestic food shortages and scarce capital for development—look to their fisheries as a source of protein-rich foods, and for substantial income from exports. However, before the LDCs surge ahead with the development of their fisheries, they need to consider the possible consequences of the strategies available to them, benefiting from the past experiences of other countries which have preceded them in fisheries development.

Timely lessons may be drawn from the fisheries-development experiences of Brazil, Thailand, and Japan; but the development of Mexico's shrimp industry on the Pacific coast provides a particularly instructive case.[1] The growth of its shrimp-export trade has been extraordinary, especially with regard to the income it has generated and the phenomenal quantities of capital it has accumulated. Crustaceans—not petroleum, cotton, sugar, or any other primary commodity—are Mexico's leading export item in terms of total value.[2] Today the state-instituted, urban-based industry boasts seven trawler fleets with more than 450 vessels; ten freezing, packing, and canning plants; two fisheries-research institutions; one shipyard; and two Mexican-owned importing corporations (chartered in the United States and located in San Diego, California). More than 94 percent of the industry's shrimp catch is exported—around 30,000 metric tons last year, which brought nearly $80 million in the international marketplace.[3]

The growth of the shrimp industry has not been without its problems, especially those stemming from its dependency upon the United States, which is the major buyer of its production. But there is also a poignant and relatively unknown chapter in the story of its growth: the decline of the inshore fisheries and the corresponding impoverishment of thousands of rural-coastal peoples. By and large, the plight of these peoples is relatively unknown outside of the regions they inhabit. But their situation demonstrates how the development of one export industry—in this case Mexico's Pacific shrimp industry—can work unforeseen hardships in certain rural enclaves, and illustrates some of the larger problems created by the dependency of the LDCs upon the developed nations. Those involved in developing social and economic policy must become more aware of the ramifications created by the introduction of any new technology in a society.

South Sinaloa: A Case in Point

Coastal lagoons, salt marshes, and estuaries are important features of Mexico's

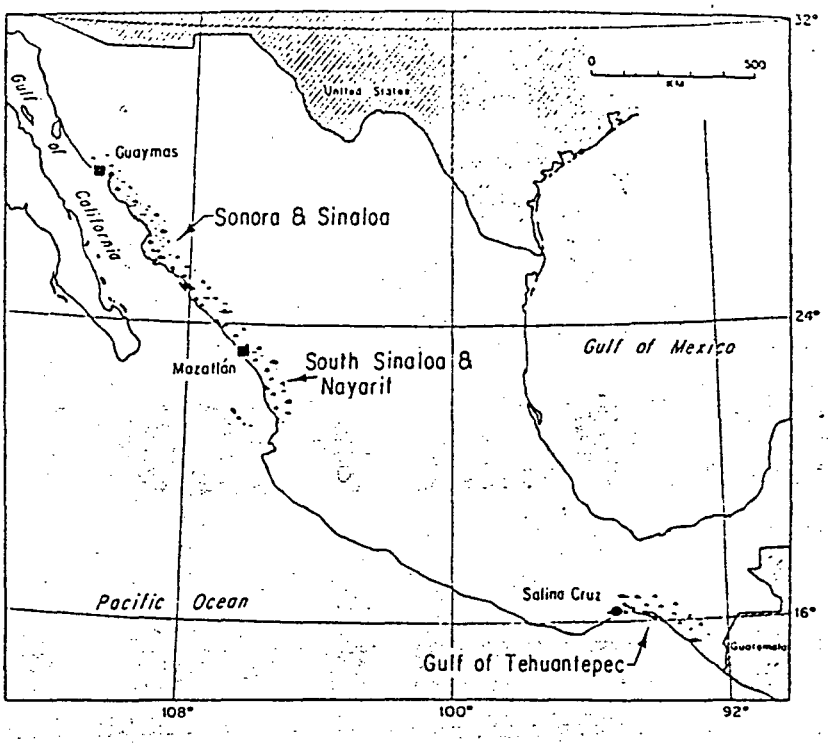
Pacific coast (see Map 1). [illegible]e regions are the major inshore fisheries and the main rearing grounds for Mexico's commercially important species of shrimp. In former times they also produced great quantities of other seafoods, particularly oysters and fish.

Although this article focuses on the rural fisheries in the *municipio* [a legal unit similar to a U.S. county] of Escuinapa, south Sinaloa, the situation described for that region is duplicated to a greater or lesser extent in all of Pacific Mexico's rural-coastal fisheries. South Sinaloa is where today's shrimp-export industry had its beginnings, and in that region the social, economic, and political problems accompanying the growth of the industry have reached their point of greatest strain. Northward, among the lagoons and estuaries of Sonora, the rural population is relatively less dense, and southward, in the rural regions of the Gulf of Tehuantepec, the impact of the shrimp-export industry has been less severe. Nevertheless, living conditions in all of Pacific Mexico's rural-coastal regions are distressing.

In south Sinaloa average personal incomes of the region's household heads are less than $400 U.S. per year. Day-wage laborers in agriculture earn only about $2.50 U.S. per day when employed. Only 0.3 percent of the population has professional or technical training, and in the rural settlements less than two years of primary school is the mean educational level.

Most dwellings are crowded, squalid, and barren within, lacking sanitary facilities and running water. Fresh drinking water is always in short supply, and health and nutritional levels are extremely low. Infant mortality rates, moreover, are rising for the first time in decades, and the entire population is plagued by a variety of severe diseases—pervasive gastro-enteritis, amebiasis, and hepatitis, for example, as well as outbreaks of polio, tuberculosis, and rabies. In these hot and humid lowlands biting insects are also a problem.[4]

By and large, south Sinaloa's rural population owns or has access to very little productive land, so that the majority are dependent on whatever wages they can earn. More significant, however, is the fact that, in this region of extremely productive fisheries, food is often in short supply and much of the population suffers some form of nutritional disease. Only 2 percent of the total population are members of the government-instituted inshore fishing cooperatives, while the rest find their fishing activities severely constrained by laws reserving marine resources for the cooperatives.



MAP 1: Major Inshore Fisheries of Pacific Mexico.

The region's cooperatives, on the other hand, annually produce about 700 metric tons of shrimp—enough to provide every man, woman, and child with roughly 23 kilograms (more than 50 pounds) of that protein-rich food—but nearly 100 percent of that production is exported. And even the *cooperativistas* (members of the fishing cooperative), who have permission to harvest the region's seafoods, earn slightly under $700 U.S. per year.[5] Why, one wonders, are conditions so bad in these regions—the richest inshore fisheries of Pacific Mexico?

South Sinaloa's Coastal History

South Sinaloa's inshore fisheries were not always underdeveloped, nor were their human inhabitants as cut off from marine resources as they are today. Indeed, people have relied upon this region's rich coastal resources for at least 8,000 years, perhaps longer, and evidence of a considerable and long-term maritime history is clearly apparent to even a casual observer.[6]

The whole coastal region contains numerous shell mounds, some more than 3 kilometers long and 180 meters wide, with peaks reaching 11 meters. Not far from Escuinapa, head town of the *municipio* by that same name, archeologists have recently discovered a particularly large shell mound—a proto-pyramid, perhaps—21 meters high, quadrilateral in shape, and flat on top. Radiocarbon dating indicates that this structure was built about 2,000 years ago, suggesting the existence of coastal chiefdoms, and perhaps even nascent states, which subsisted upon the region's seafoods 16 centuries before the arrival of the Spanish conquerors.[7]

Estimates of the pre-Colombian population vary and are speculative, but some historians suggest that a relatively dense population inhabited the coastal plain at the time of the Conquest in the early 16th century.[8] Apparently, the Conquest-era aboriginal population was part of the Mesoamerican culture tradition, the same

OPPOSITE: Because rural houses around Teacapán, south Sinaloa, lack modern sanitary facilities, the inhabitants suffer a high incidence of nutritional, infectious, and parasitic diseases.

as the Aztec and Maya. They built platform mounds and ball courts on the higher ground behind the coastal zone; they decorated their pottery in the Mesoamerican style; they grew corn, beans, and squash along the river courses; and they harvested and traded great quantities of seafoods from the estuaries and lagoons.

The conquest of south Sinaloa brought about the destruction of the aboriginal population. The Indians were victims of diseases introduced by the Spaniards, and their ranks were further reduced by a number of factors which were either non-existent, or at least not as severe, in other parts of Conquest-era Mexico. They had the misfortune of being conquered initially by Nuño de Guzmán, one of the era's most genocidal *conquistadores*. Soon thereafter, many were taken as slaves for the mines in the Sierra Madre Occidental, and for Cuba's sugar plantations. The scattered few who remained were pushed out of the region, displaced by the lords of cattle-raising *haciendas* which became common in this region. Indeed, the region was effectively depopulated of indigenous peoples by the 1750s, and today none inhabit the coastal zone.

For nearly three centuries thereafter the region was almost empty of human inhabitants, and its abundant marine resources went unexploited. Then, in the early to middle 19th century, a trickle of new settlers arrived—*mestizo* immigrants from other parts of Mexico. They settled the coastal lands that became available following Mexico's independence from Spain in 1821. Still more immigrants came after the French occupation in 1867.

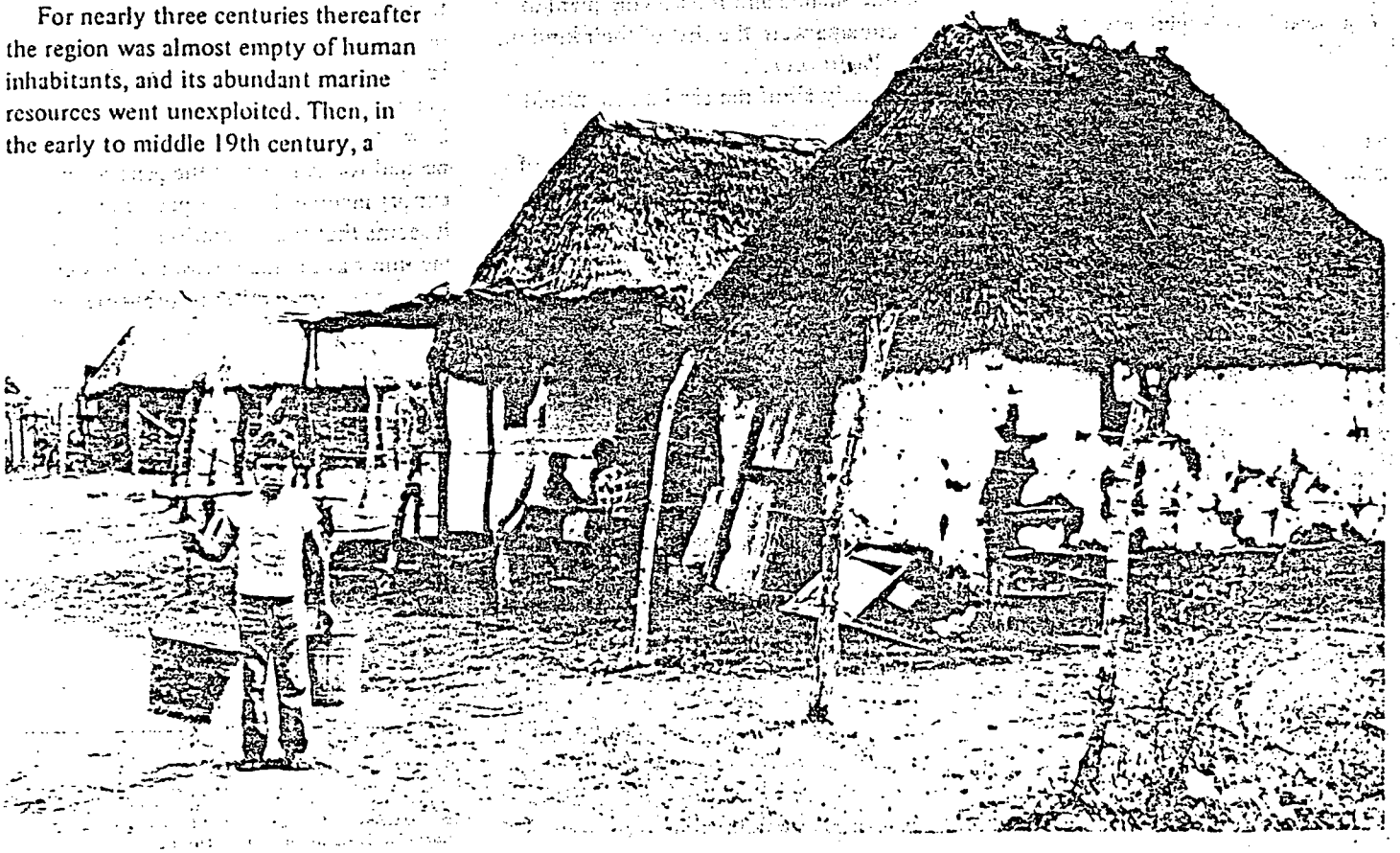
These new arrivals were quick to recognize the potential of the region's marine resources for subsistence and for commerce, and soon south Sinaloa's smoked oysters and salted shrimp were carried by muleteers across the Sierra to Durango and southward toward Guadalajara and Mexico City.

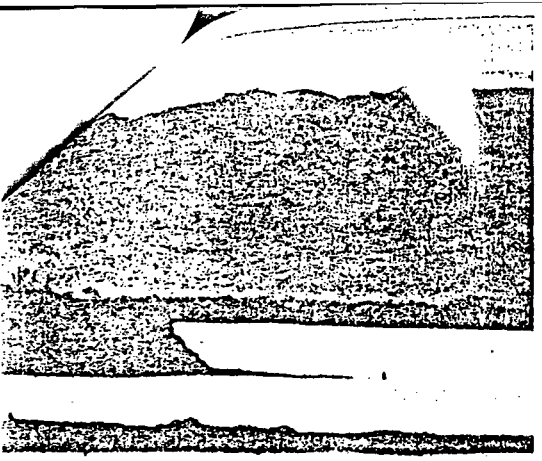
The landmark event for these fisheries occurred in the early 1870s when Chinese immigrants from Mazatlán visited the region around Escuinapa, bought large quantities of shrimp and oysters, and began to sell these to buyers from the United States, China, and Japan. In this manner, south Sinaloa's inshore fisheries made their debut in the international marketplace.[9]

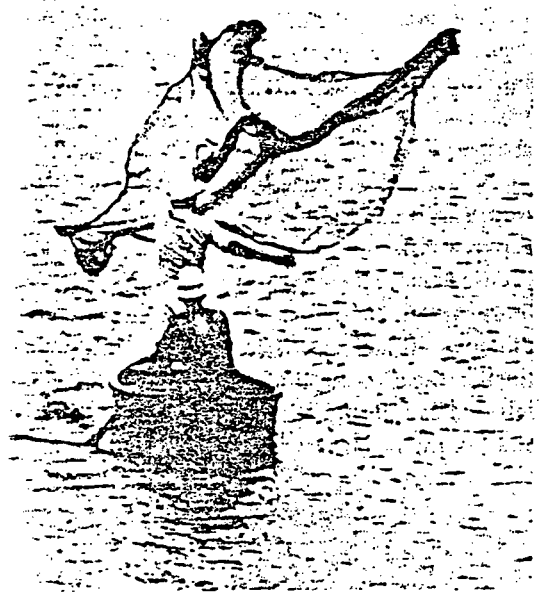
By the outbreak of the Revolution in 1910, serious conflicts had arisen over the region's marine resources. The Diaz administration granted exclusive fishing rights to a number of small companies and limited subsistence fishing to regional fishermen not employed by the companies. During the Revolution, the brief Madero administration declared that subsistence fishing activities would be "free," and not subject to regulation.[10]

Today subsistence fishermen are still identified as *pescadores libres*, but now the term has a pejorative, criminal connotation, especially among fishing-industry officials, who use the term to refer to fishermen who are not members of the state-sanctioned rural-fishing cooperatives. Theoretically, subsistence fishing is still "free," but in actual practice it is greatly encumbered by various regulations that forbid shrimp harvesting for much of the year, or that prohibit such fishing in territories exclusively reserved for the cooperatives.

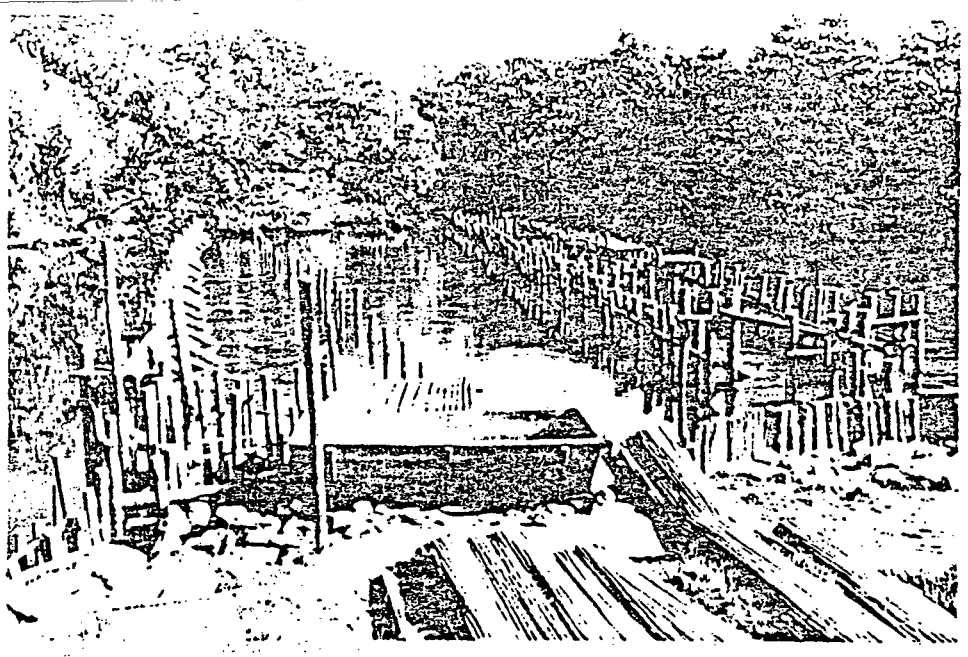
By the end of the Revolution, vessels from Japan and the United States were actively shrimp trawling along Mexico's Pacific coast. Mexico was powerless to prevent such incursions at that time; moreover, it lacked sufficient capital to finance the construction of its own vessels. Instead, it attempted to regulate and tax the foreigners fishing offshore,







"Pescadores libres"—subsistence fishermen.



This weir (called a *tapo*), which belongs to an inshore fishing cooperative on the El Mezcal estuary, south Sinaloa, is not in production. Its fencing has been rolled up and placed on the shore (foreground) so it will not rot. Rudimentary weirs such as these were the main technological items facilitating the beginnings of Mexico's Pacific shrimp industry in the 1930s.

while developing its own shrimp-export industry in its inshore fisheries.

Offshore, the Japanese eventually gained pre-eminence in the international shrimp market and drove their competitors from Mexico's Pacific coast by the middle 1930s. However, on the eve of World War II in 1939, fearing for the safety of its vessels so far from home, Japan abruptly withdrew its fleets from the area. Now at last Mexico had decisive control over all of its Pacific shrimp fisheries, and at this juncture it began to develop its own offshore fleets.

The Cooperatives

Mexico had already developed a system of state-instituted, inshore fishing cooperatives and central packing plants. Shortly after the Revolution, the Pacific's lagoonal and estuarial regions were declared federal territories. Then, with passage of the *Ley General de Cooperativas* in 1933, the nation undertook development of the various "enterprises of State participation" which characterize its Pacific fishing industry today.[11] Producers' cooperatives were established in the rural areas, along with a number of central packing plants for export operations. The rural fishing cooperatives of south Sinaloa and the packing plant at Escuinapa were the first of their kind on the Pacific coast.

Nearly all of the capital committed for the development of these enterprises went toward the construction of the regional packing plants. Development of the inshore fishing cooperatives involved little more than granting exclusive fishing territories and the recruitment of rural fishermen. The rural cooperatives required only rudimentary and fairly inexpensive weirs, which were constructed of mangrove posts and erected across tidal channels.

The rural cooperatives were inextricably bound to the regional packing plants by the terms of their charters. They were required to turn over all their exportable production to these plants, and to accept payment at whatever price levels the federal government annually established. Only in the conduct of their own internal affairs were they allowed to act as autonomous entities. Initially, this was not a handicap to the rural *cooperativistas*: marine resources were plentiful, the new organizations accepted nearly all rural fishermen wishing to join, and prices were such that most fishermen greatly increased their incomes.

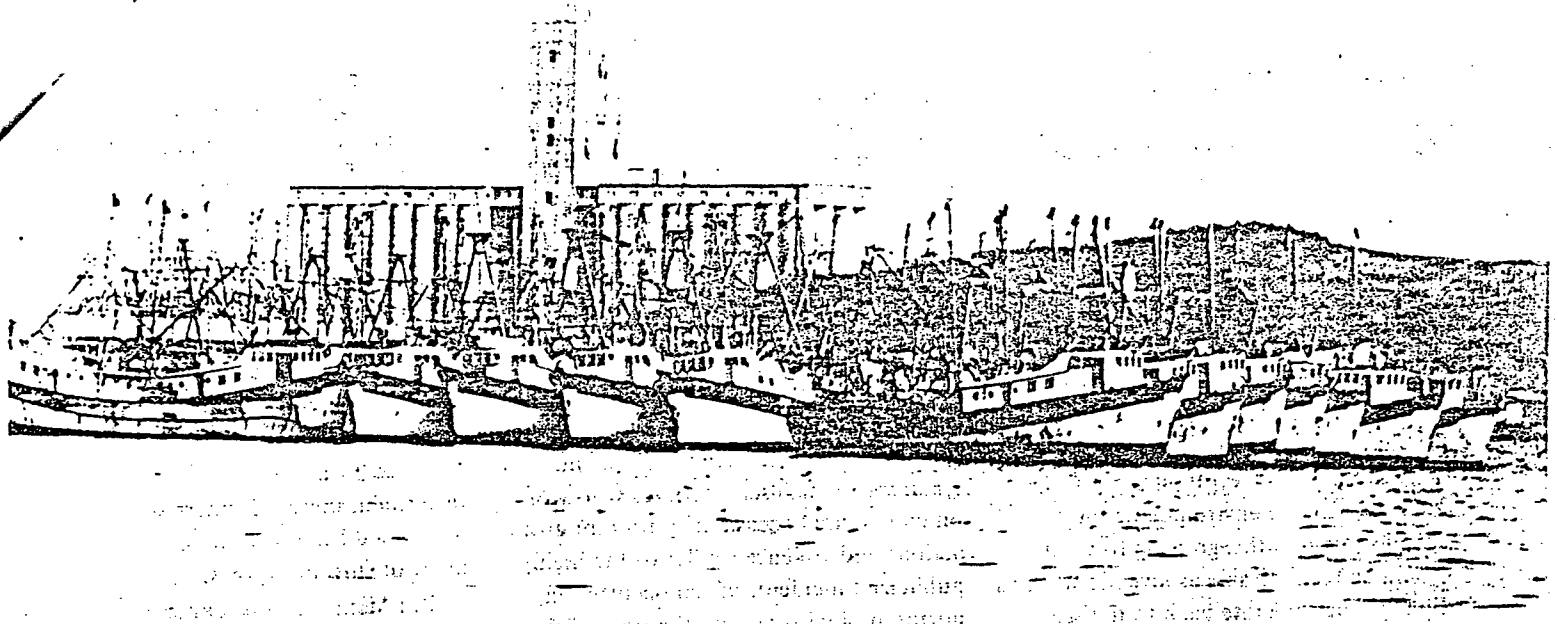
This was also the era of the establishment of the nation's agrarian *ejidos*,* and the rural fishing cooperatives were similarly hailed as important socio-economic reforms. Proponents claimed they would raise the standard of living of rural-coastal inhabitants and encourage wide participation in the fishing industry, and that the entire nation would benefit through the production of vitally needed foodstuffs and the generation of export income. In retrospect, however, it seems that the generation of export income was the main reason they were founded, for the other reform-oriented goals have eroded.

Social and Technological Problems

As economic entities, the rural cooperatives were fairly successful from the time of their inception through the middle 1960s, when Mexico's offshore shrimp-trawling industry finally overshadowed them. But long before that they had begun to suffer from serious problems.

Probably the most serious early problem was *caciquismo* (a corrupt, politi-

* Lands distributed to rural peasants as part of Mexico's post-revolutionary programs of land reform. Such lands are communally owned by a rural community; specific plots are assigned for an individual's use at no charge so long as he works the plot.



Shrimp trawlers with processing facilities in background, Guaymas, Sonora.

cal-economic bossism). During the Alemán administration, 1946-1952, *caciquismo* became widespread in the cooperatives, and it is still a problem in south Sinaloa. In many cases corrupt businessmen-politicians undertook to run the cooperatives for their own personal gain, relegating the *cooperativistas* to the status of mere shift laborers and denying them participation in the cooperatives' internal affairs—a right guaranteed in the organizations' charters. During that same period analogous situations arose on the nation's *ejidos*, particularly those producing export items.[12]

Other serious problems surfaced. The federal government periodically appropriated lands and redistributed these to impoverished peasants (*campesinos*)—resettling many of these into Sinaloa from other parts of the nation. South Sinaloa's rural-coastal population boomed, growing from around 8,000 persons in 1935 to nearly 31,000 in 1970.[13] As a result, competition for local marine resources intensified. Eventually the rural fishing cooperatives became entrenched economic entities, serving only a minority of the rural-coastal population. Internally, the cooperative also suffered from the effects of population growth, since membership rights could be inherited by members' descendants. Today south Sinaloa's cooperatives have more members than they need, and incomes must be shared with many marginally productive members.

Thus, by the early 1950s, south Sinaloa's rural-coastal population began to suffer serious strains, and the situation was greatly aggravated by the introduction of outboard motors and nylon nets into the fishery at that time. The use of outboard motors with large dugout canoes eased the transport of very large nets, while the nylon nets themselves, because they are nearly invisible underwater, proved disastrously effective in catching fish.

By that time most of the region's shrimp and oyster production was being sent abroad, so the fish which existed in great abundance in the estuaries and lagoons—snappers, snooks, drumfishes, mullets, and so forth—became the new mainstays of domestic consumption. However, the nylon nets quickly ravaged the inshore fish stocks, reducing them to very low levels within only a few years. Rural fishermen speak of former times, before the introduction of the motors and nets, when the surface waters of the lagoons sometimes appeared red from the shoals of snappers congregated there. Continued fishing pressure prevents the recovery of these resources, and today's net fishermen rely upon secondary species—so-called trash fish—which are converted into fish meal, a high-protein dietary supplement for poultry and livestock.

Why was the drastic over-harvesting of these prodigious fish stocks not prevented by the federal government, since it is empowered to regulate these fisheries? One reason may be that the fish, however important as domestic foodstuffs, were the major predators upon the region's shrimp stocks.

Other factors also contributed to the rapid decline of south Sinaloa's fisheries. Natural catastrophes, for instance, have played a part. In 1967 during the fall rainy season, a particularly severe flood buried the region's oyster beds under tons of silt, causing an almost total loss of that resource. Such floods have happened before in the region, at times with devastating consequences. Another flood in about 1300 A.D. similarly destroyed the region's oyster beds, forcing the partial abandonment of the fishery for a number of years thereafter.[14] Following the flood in 1967, the federal government imposed a moratorium on oyster harvesting and attempted to reestablish the beds; but its efforts have been only partly successful because the reduced oyster stocks have been subject to heavy pressure by rural *campesinos*, who illegally harvest them in order to provide food for their families. The oysters have also been damaged by contaminants—chemical pesticides mostly—used in the region's agricultural sector.

Offshore Trawling

Overshadowing all these disasters, however, has been the government's development of offshore trawling. The

development of the trawling industry has brought about a parallel underdevelopment of the inshore fisheries. To understand why, it is necessary to comprehend the life cycle of Pacific Mexico's commercially important species of shrimp, all members of the *Penaeid* family.

In simplest terms, the shrimp are hatched from fertilized eggs in the open sea, and then, in the form of microscopically small larvae, they migrate up coastal estuaries and into briny lagoons. In those delicate environments they spend some months, growing to what would be recognizable as juvenile shrimps. Finally, they migrate back to the sea, reach their maximal size, and eventually spawn, thus completing their life cycle.[15] Their seaward migration is particularly intense during the fall rainy season, when the influx of fresh water greatly reduces the salinity of the lagoons, and it is this movement on which inshore fishermen have relied for millennia.

From the perspective of Mexico's offshore shrimp-exporting sector and the marine biologists and fisheries managers who advise it, harvesting shrimp while they inhabit the inshore waters is regarded as poor practice. Inshore harvesting takes the shrimp out of the ecosystem before they have a chance to spawn, which threatens the ability of the resource to recover rapidly. Also, by removing the shrimp before they reach adult size, the ecosystem's maximum potential shrimp biomass is not produced. Furthermore, the large adult shrimp caught offshore bring higher prices per unit of weight in the international marketplace. Finally, harvesting shrimp with trawlers is less costly and far more productive than the low-yield, labor-intensive methods employed by inshore fishermen.[16]

Thus, as Mexico pursued the development of shrimp-export trade in this century, it progressively curtailed the inshore shrimp harvest, dissociating the rural population from a resource that had been central to their subsistence and commerce.

Production figures for 1950-1970 for the Pacific's offshore sector and also for south Sinaloa's major inshore cooperative indicate the dramatic increase in offshore production and the correspondingly dramatic decrease in production inshore (see Figure 1). Today the government permits south Sinaloa's rural cooperatives to harvest shrimp for only 10 to 12 weeks per year, whereas the voracious offshore trawlers are allowed 35 to 40 weeks of production annually.

Other factors are indicative of the stressful quality of life in this rural-coastal zone. Ongoing conflicts among landowners, landless *campesinos*, and *ejidatarios* (small-scale farmers who work on *ejido* lands) occasionally prompt group actions and violence similar to the highly publicized incidents which occurred in northern Sinaloa around the time of the last presidential succession. Severe conflicts also exist over rights to regional marine resources. *Campesinos* in the rural settlements sometimes shoot at the cooperatives' trucks—especially at night—as the vehicles pass through the countryside on their journeys between the lagoonal weirs and the packing plant. *Campesinos* engaged in subsistence fishing are sometimes arrested by soldiers from the *Infantería Marina* (the Mexican Navy's infantry), who are deployed in the fisheries during the fall shrimp harvest to enforce the cooperative's exclusive rights. Such enforcement measures have been only partly successful, however, because of the rural fishermen's dispersion in the labyrinthian systems of estuaries and lagoons. A few large-scale shrimp contrabanders also seem to operate with relative impunity, perhaps buying their security.

South Sinaloa's rural fishermen are not ignorant of the events which have marginalized their traditional way of life. Often, in the context of discussions concerning the development of offshore trawling, they exclaim, "*Camarón que duerme se la lleva la marea*" ("A shrimp that sleeps is taken by the tide"). The statement is an ironic, self-conscious acknowledgement of their socio-political dormancy as well as their inability to stem the tide of events which has impoverished them.

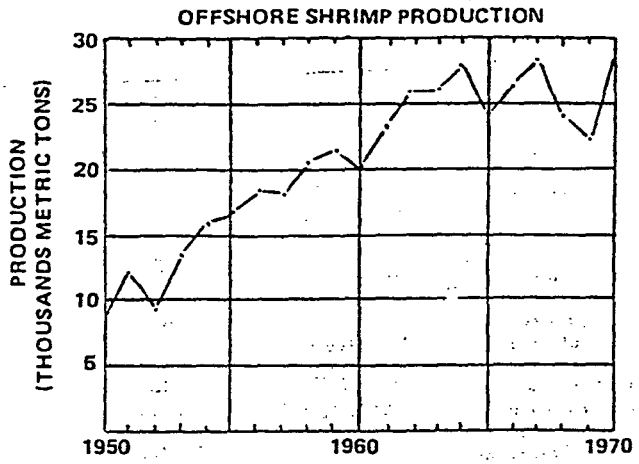
Current Policy

It would be glib to conclude that the negative consequences of developing Pacific Mexico's shrimp-export industry could have been easily avoided. Hindsight is always clearer than foresight. When today's shrimp-export industry was first organized, the nation was badly in need of capital to finance its reconstruction, and, at least initially, the inshore fishing cooperatives did elevate the standard of living in the rural-coastal areas. In 1933 the post-Revolutionary leaders could not have foreseen the great population growth to come and, given the nation's preoccupation with its agricultural sector and a lack of interest in the cultural traditions of the inshore fishermen, these reformers should not be blamed for emphasizing the development of shrimp exports.

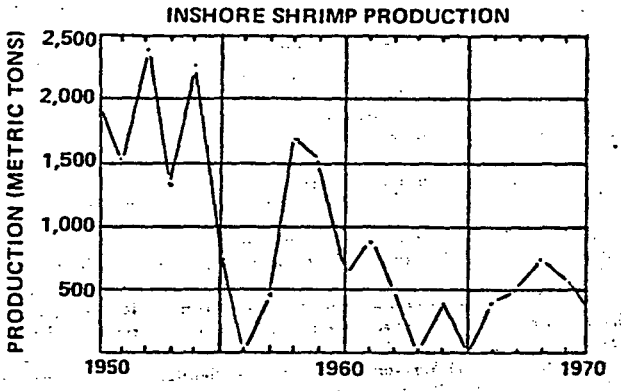
But Mexico is now experiencing acute and widespread food shortages, rising infant mortality rates, and an exodus of its rural poor to its crowded cities and to the United States.[17] Nevertheless, the federal government continues to announce plans to further develop its shrimp-export industry, despite increasing evidence that the industry has already reached the limits of its growth. Shrimp stocks have been declining for a number of years.[18] Some industry entrepreneurs question the evidence, pointing out steady production increases over the past decade; but the industry's own fisheries biologists counter that such increases only reflect the annual addition of new trawlers to the fleets. Various methods for increasing shrimp stocks are still being tried. The most important involves dredging projects which would facilitate the shrimp migrations between offshore and inshore waters; but these do not promise to make a significant difference over the long run.

Furthermore, since the industry exports nearly all of its production, its dependency upon the international market—and especially the United States, its major customer—often places it in a precarious economic position. In 1971, for example, the United States' unilateral imposition of a 10 percent surcharge on import tariffs precipitated an economic crisis having painful ramifications throughout Mexico's shrimp industry. President Echeverría responded by courting other foreign buyers for Mexican shrimp, particularly the Japanese, promising he would "weaken the embrace of the North," but such actions were futile:[19] The United States is still the major purchaser of Mexico's shrimp exports, and the industry is still highly

FIGURE 1. Shrimp production in Pacific Mexico, 1950-1970.



Annual offshore shrimp production for Mexico's Pacific coast. Offshore production rose almost 300 percent during the twenty years, 1950-1970. SOURCE: Instituto de Pesca, Mexico, D.F.



* Mexico imposed a moratorium on production in these years.

Annual shrimp production of south Sinaloa's major inshore fishing cooperative. Inshore shrimp production dropped from a high of 2,400 metric tons in 1952 to a low of 400 metric tons in 1970. SOURCE: Mendoza von Borstel, Xavier, Mem. IV. Congr. Nac. Oceanografia (Mexico); 407-418, 1972.

vulnerable to the vagaries of the international marketplace.

Dependency upon the international market has also caused the industry to engage in market behavior which seems indefensible for a nation experiencing food shortages. In spring 1978, for example, stories appeared in the nation's press reporting the destruction of large quantities of seafood in order to drive up its price in the international market. In the same period domestic food supplies were reported scarcer than ever. Those resources might instead have been distributed to ultimate consumers in food-deficient regions.

Mexico needs to seriously reconsider its policies for the management and development of its Pacific-coastal fisheries. It should stress revitalization of the inshore fisheries, encourage the resurgence of inshore fish stocks, and relax its restrictions upon individualistic subsistence fishermen and small-scale regional commerce. Positive steps should also be taken to invigorate the nation's domestic seafood markets.

Such a change of policy might not be as radical as it first seems. Indeed, it may come about naturally as increased exports of petroleum from the Campeche Bank appreciate the *peso*, thus reducing the relative profitability of shrimp exports. Perhaps then the nation will not have to rely as heavily as it has in the past upon the export of an important food commodity.

Few LDCs are fortunate enough to have huge undeveloped reserves of energy resources, but they—and those countries and international agencies which are assisting them—could learn much from the development of Mexico's shrimp-export industry. The Philippines, for example, has both rich shrimp resources and a large, traditional, rural-coastal fishing population, and that nation is now actively developing its fisheries. Having established a 200-mile offshore economic zone, the Philippines—like many other coastal LDCs—is being lured by the export income which certain seafoods promise. Unfortunately, many LDCs ignore the poverty of their rural-coastal regions, viewing that and the development of their fisheries as distinct; or unrelated, problems. Here the work of anthropologists, ethnohistorians, rural sociologists, and economists could inform the course of these nations' future fisheries' development.[20]

Fishing is a small part of the GNP in most countries. Even in Japan, a nation well known for its extensive fisheries and fishing traditions, the value of agricultural output exceeds that of fishing by 50 times.[21] As a result of its relatively small role in most nations, fisheries are often not well understood as a socio-economic phenomenon. This may lead national economic planners to lump various forms of fishing under one rubric, so that they fail to distinguish crucial differences between subsistence versus commercial fishing, or inshore versus offshore fishing. Moreover, many nations may not be sufficiently aware—because they lack the appropriate information—that increased income from fisheries' exports may, in some cases, be more than offset by the consequent social and economic costs in their rural-coastal zones.

These considerations, as well as the undesirability of economic dependence on foreign markets, suggest that LDCs should exercise great caution when planning to develop fishing industries predicated on the production of income from exports Moreover, the participation of their own rural poor in fisheries development should, as a matter of policy, be given at least equal importance with the possible income the fisheries can generate.

NOTES

1. See James Russell McGoodwin, Fisheries Policy and the Underdevelopment of Inshore Pacific Mexico, Woods Hole Oceanographic Institution, Technical Report 79-44, 1979, p. 6; also, by the same author, "The Decline of Mexico's Pacific Inshore Fisheries," Oceanus 22 (1979): 52.

2. Food and Agriculture Organization, Trade Yearbook 1972, FAO, Rome, 1972: United Nations, Economic Survey of Latin America 1972, U.N., New York, 1972.

3. Centro de Estudios Políticos Económicos y Sociales, Sintesis Estatal 1968-1978, and Jornades de Información y Estudio para la Programamación del Desarollo de Sinaloa 1968-1978, Centro de Estudios Políticos Económicos y Sociales, Culiacán, Sinaloa, 1968-1978 (annual reports).

4. Manuel Casas Pérez and Gabriel Rodriquez Salgado, Estudio para el Financiamiento Agropecuario en la Zona Sur de Sinaloa, Banco Agropecuario, Mexico, D. F., 1967.

5. Note 3 above.

6. Carl I. Hubbs and Gunnar I. Roden, "Oceanography and Marine Life Along the Pacific Coast of Middle America," in Robert C. West, ed., Handbook of Middle American Indians, Volume 1, Univ. of Texas Press, Austin, 1964.

(continued on page 42)