

Andres Quintana Roo Scale Fish

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1 Part I: Static Analysis - Collective action

Andres Quintana Roo is located in the Quintana Roo peninsula in Mexico. Its nearly 900 kilometers of coastline includes all the Mexican Caribbean shore as well as a short stretch of the Gulf of Mexico's shores. The state's fishing industry is only second to tourism (in terms of income). The resource appropriated is scale fish. The resource discussed includes the waters along the immediate shore stretching from Punta Herrero to Rio de Bacalar Chico (Southern Zone). The western boundary is the shore and the eastern boundary is Banco Chinchorro. The fisheries are regulated by the federal government and exploited by cooperatives along the Quintana Roos shore as well as independent fishermen. The natural infrastructure of the system consists of the limited shelf area along the Caribbean shore, cays lagoons, and around Banco Chinchorro, about 35 kilometers off the coast. The institutional boundaries correspond to the geographic range assigned to cooperatives as well as to the political boundaries of the state. In the case of scale fish, there are little restrictions because unlike the other resource users harvesting from these fisheries, scale fish harvesters are not organized by cooperatives or firms.

This case was part of the original Common-Pool-Resource (CPR) database developed in the 1980s by Edella Schlager and Shui Yan Tang at Indiana University, and the original report can be found at <https://seslibrary.asu.edu/seslibrary/case/26/view>

1.1 The Commons Dilemma

There was no commons dilemma at the time of the study, only the possibility of the over-exploitation of scale fish in the fisheries. There is no evidence that scale fish stocks have ever collapsed, but it is believe that they were heavily harvested at the peak of the Mayan empire. It appears that fishermen have not depleted their fish stock and catch levels have remained high.

1.2 Biophysical Context (IAD)

- **Resource = Natural Infrastructure:**

The natural infrastructure of the system consists of the limited shelf area along the Caribbean shore, cays lagoons, and around Banco Chinchorro, about 35 kilometers off the coast. Biological productivity levels in the area are high due to the abundance of reef and shallow coastal waters, which provide high abundances of photosynthetic organisms, turtle grass, and mangrove trees.

- **Human-Made Infrastructure:**

Human-made hard infrastructure, both public and private, mediates the interaction

between the resource and the resource users. Private technologies include gear for the preferred fishing technique of skin-diving, which was introduced in 1960 (mostly for tourist or for subsistence). Fishermen limit their activity to beach weirs, specially when winter storms trigger near-shore migrations. Technology also includes plywood 6 meter skiffs powered by 6 hp outboards with inboard diesel engines in which fishermen travel to fish.

In terms of soft infrastructure, there is basically none, other than a fishing permit. Everyone can fish year round and it is up to each fisherman to decide when to stop fishing and when to remove their traps or beach weirs.

In terms of public hard infrastructure, roads to remote parts of the coast were opened, the advisory function of government officials was increased, and new fisheries offices were established. A processing plant was built in Xcalak, along with a small desalinization plant of small capacity, designed to produce five tons of ice per day for local fishermen and to serve as a reception and processing center.

1.3 Attributes of the Community (IAD)

- **Human-Infrastructure:**

The resource users constitute local villagers (including the San Andres Cooperative, which was organized in 1959 starting with 49 lobster fishermen) harvesting for local and national consumption. Population was mostly made up of state-born villagers, with a few inhabitants coming from neighboring states, native Mayan-mestizo and Mayan inhabitants, and even fewer from countries like Belize, Spain, Honduras, and the USA. By 1979, the population was mostly immigrants from neighboring states; most of these immigrant fishermen were not allowed to join cooperatives and only harvest fin and scale fish.

The federal government constitutes the main public infrastructure provider for regulating the states fisheries, and in the 1950s, it implemented development programs to stimulate change from traditional to modern forms of marine resource exploitation.

The Federal Secretary of Fisheries and Agriculture (SAGARPA) is in charge of fisheries regulation via its National Fisheries Commission (CONAPESCA), which issues permits, certifies legality of capture, and enforces regulations. They cooperate closely with state government personnel in the development and implementation of policy.

The National Fisheries Institute (INAPESCA) provides data to assist local and regional planning, regulation and management. Other federal development programs that increase the commercialization of the fishery have included the provision of low interest loans for the purchase of gear and vessels, the establishment of technical schools and shore-side processing facilities, and an attempt to increase advisory functions of government representatives working with cooperatives and independent fishermen.

- **Social-Infrastructure**

Historically, it had been agreed that policies and programs originating in Mexico City were less than permanent and not always appropriate, giving way to a system in which the rules could be stretched to allow for various demands or in situations created by problems of documentation, communication, and transport. This pattern was eroded by increasing federalization of the fisheries offices, with increasing numbers

of outsiders being put in charge and lower-level public servants finding it harder to rationalize preferential treatment or justify bending the rules in case of exigency.

After the cooperative was formed, many fishermen kept previous arrangements with fish buyers who sponsored them with loans, gear, and boats in exchange for a share of the capture and the exclusive right to purchase the rest. Although buyers were instrumental in organizing their own people into cooperatives, this activity allowed the buyers to retain access to the high profits of the fisheries.

1.4 Rules in Use (IAD)

- **Position Rules:**

There are several positions in the southern Quintana Roo fishing system, first there are scale fishermen that could be cooperative members or independent fishermen. Any citizen has the right to join a cooperative as long as it can be established that he is of “good moral” character. There are also buyers that sponsor fishermen with loans, gear and boats in exchange for a share and exclusive right to purchase the rest of the capture. Local representatives from the Federal Fisheries Department (CONAPESCA) in charge of enforcing regulations, issuing permits as well as certifying the legality of the capture. Finally, there are representatives from the National Fisheries Institute (INAPESCA) in charge of providing data to assist in the planning, regulating and management of the marine resources.

- **Boundary Rules:**

All fishermen must have ID cards and permits for harvesting scale fish, except when harvesting for subsistence. All equipment must be registered, capture must be legally registered by CONAPESCA officials upon landing and taxes paid in order to transport the product to the market.

- **Choice Rules:**

Any fishermen can harvest scale fish anywhere in the state: usually cooperative members generally only harvest on their own zone to avoid suspicion of invading another zone and disputes. Also, fishermen can harvest scale fish doesn't all year round since there is no closed season.

- **Payoff Rules:**

Fishermen may sell their catch at market price to anyone unless there is a prior arrangement with a fish buyer.

1.5 Summary

The federal focus on targeting the state's fisheries for increased production to provide more food and employment comes in conflict with the lack of effective monitoring strategies for catch, the control that fish buyers have over the development of cooperatives, and the problem of specialization in place of fishery diversification.

Given the high exploitation of lobster and conch and the scarcity of fish in Chetumal, low monthly quotas were assigned to members by the co-ops administration in order to stimulate fishermen to return to scale fishing. However, these were generally ignored and officials were forced to put increasing pressure on the co-op to observe the quotas. Despite concerted efforts to diversity the zone's fisheries, fishermen resisted and continued to have

conch and lobster fishing as their primary activity, leaving Chetumals demand for fresh fish unsatisfied.

The creation of cooperatives in a way has prevented the constant over exploitation of scale fish in the region. The moment, in which lobster becomes scarce, scale fish will be exploited to a point in which the resource will be depleted.

2 Part II. Dynamic Analysis - Robustness

In 1986, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) established the Sian Ka'an biosphere reserve in the eastern shore of the Yucatan Peninsula. Part of the area in this study is included in the reserve which promotes the conservation while fostering sustainable use to meet the sustenance needs of local people. Some areas of this reserve are off and certain buffer zones accommodate all fishing needs (commercial and artisanal), recreational anglers, snorkelers and sightseers. These locations are determined based on ecological importance: critical areas like spawning grounds are protected while less critical areas are remain available to residents for their use.

2.1 Shocks, Capacities, Vulnerabilities

Nonetheless, Sian Ka'an is under serious threat, development in the entire State of Quintana Roo is booming, and the scourge of ecologically insensitive development vividly displayed in Cancun is fast approaching the borders of the Reserve. Large-scale ecosystem changes have already appeared throughout the region. Nutrient loading and other forms of pollution affect the coastal ecosystem, and poor land use practices have severely lowered water quality. Important habitats that are linked to the coral reef system, such as sea grass beds and mangrove forests, are being destroyed; this is undermining the reef's ability to function. Without proper management of all the components of the ecosystem, the viability of entire coastal zone is threatened.