

# Aquaculture as an Alternative Occupation on the Pacific Coast of Costa Rica

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Recent studies on traditional small-scale fisheries in less developed countries usually point out problems of resource management that are due to poorly developed or deficient data collection systems which do not permit analysis. Also, it is commonly stated that many of the stocks fished by these small-scale fishermen are overexploited. Vague recommendations are given that governments must implement management measures and provide alternative economic opportunities to draw fishermen away from or at least prevent further growth of the fishing activity. Unfortunately, few concrete solutions to these problems have been offered or tested.

A typical small-scale tropical fishery operates in the Gulf of Nicoya (Pacific), Costa Rica. This 1,500-km<sup>2</sup> estuary supports more than 2,100 fishermen who supply the majority of the finfish consumed within Costa Rica (Fig. 1). Though up to 25 species comprise the majority of fish landings, the most popularly consumed fishes in Costa Rica are a few species of croaker (*Sciaenidae: Cynoscion* spp.), snapper (*Lutjanidae: Lutjanus* spp.) and snook (*Centropomidae: Centropomus* spp.).

As a social group, these same fishermen constitute one of the most socially, economically and politically marginal sectors of Costa Rican society. Though their marginal status may be due to poorly developed infrastructural facilities and marketing systems, it is likely that the Gulf of Nicoya has long been saturated with fishermen to the point that the stocks are overexploited.

In the interior of the Gulf are extensive mangrove forests located in the dry northwest coastal belt of a normally very wet tropical climate. These mangrove areas are cleared and diked to build salt evaporation ponds. A typical salt evaporation pond system or *salina* contains several ponds generally from 0.5 to 1.5 m deep with increasing salinities in a landward direction (Fig. 2). Preparation and maintenance of ponds begin in November with salt production occurring throughout the dry season until late April or early May when the rains return. Throughout the rainy season the ponds are usually abandoned.

Such has been the proliferation of *salinas* that in recent years Costa Rica's



Fig. 1



Fig. 2

National Cooperative of Salt Producers is faced with an overproduction of salt and no marketing outlet. Current estimates indicate that *salinas* occupy approximately 2,500 ha in Costa Rica.

Given the situation of these two social groups in close proximity and their unique problems, it is worthwhile considering a mutual solution.

Costa Rica's National Science Council (CONICIT) is currently financing a

research project at the National University (UNA) with the objective of exploring such a solution to these problems. Near the CONICIT Marine Station (Fig. 3) on the shores of the Gulf of Nicoya, small experimental ponds designed in the style of a *salina* have been constructed (Fig. 4), where the author and a group of UNA students are carrying out aquaculture trials initially with mullets, or *lisa* in Spanish (*Mugilidae:*

1. This 1,500-km<sup>2</sup> estuary, the Gulf of Nicoya supplies the majority of the finfish consumed in Costa Rica. 2. A *salina* or salt evaporation pond system in Costa Rica. 3. Costa Rica's National Science Council (CONICIT) Marine Station. 4. Small experimental ponds designed in the style of a *salina*.

*Mugil curema*), in the first attempt in Costa Rica to cultivate native fish and also the first attempt at brackishwater aquaculture.

Prior to the initiation of these trials, an interview survey in an extensive seven-community area of the eastern shore of the Gulf of Nicoya surrounding the research site was conducted. One hundred and sixty-four small-scale fishermen (approximately 10% of the area's

include the croakers, snooks, *lisas*, snappers and catfish (Ariidae).

The majority (82%) agreed that there were far too many fishermen in the Gulf of Nicoya. The most likely reason for this observation would be that the fishermen have noted a decline in their catches in recent years. When asked about their choice of alternative employment if forced to abandon fishing, the most common reply was agriculture (26%),

Fig. 3



Fig. 4



total) and 29 *salina* operators (approximately 25% of the total) were interviewed on their general knowledge and interest toward aquaculture as a possible alternative occupation or supplemental economic activity, specifically on the current capture and use of *lisa* among the fishermen, and interest in *lisa* aquaculture among both groups. Both groups were questioned about other candidate species for aquaculture trials.

#### Small-Scale Fishermen

The majority of the small-scale fishermen interviewed (73%) did not know what aquaculture was, though after giving a brief explanation indicated that priority species for aquaculture trials should

followed by construction, repair of fishing nets, working in the *salinas*, carpentry and "anything".

Additionally, though less than half (36%) actively fish for *lisa*, it is commonly captured accidentally and sold (51%) and consumed (75%) by the majority of the fishermen.

Within the Costa Rican fish marketing system, *lisa* is included in the "trash fish" category. It is sold and consumed, in spite of its derogatory classification, at a wholesale price generally between 13 and 15 Colones/kg (43.15 Colones = \$1.00 US in March-April 1984).

#### Salina Operators

Of the 29 *salina* operators interviewed, six used their *salinas* in the rainy season.

Also, 59% were involved in other economic activities during this season so that it would be necessary to demonstrate that aquaculture was a more profitable activity than their present occupations.

At the same time, 72% indicated an interest in using their *salinas* in the rainy season for aquaculture if they were provided with the necessary technical assistance. When asked what species of fish they would prefer cultivating, the most common reply was *lisa*, followed by snapper, snook and croaker. *Lisa* apparently is a favorite since it is already a familiar fish common to the mangroves, and the *salina* operators are aware that *lisa* and shrimp (*Penaeus* spp.), a very commercially valuable fishery product, can coexist in the same pond, whereas shrimp are a preferred prey of the other fish species mentioned.

However, there are problems with marketing *lisa* which is considered a trash fish with a small market and low retail price compared with croakers, snappers and snooks. A *salina* operator may find difficulty in financing a *lisa* aquaculture project. But if shrimp, with its high value, were cultivated together with *lisa*, bank credit might be easier to obtain. The end result would be a low-value product for the regional market (*lisa*) and a high value product for a specialized regional market and for export (shrimp). The adaptation of the *salinas* for aquaculture could provide new employment sources needed for the small-scale fishermen.

In spite of the fact that less than a third of the interviewees of both social groups knew what aquaculture was, the replies indicated an overall favorable attitude toward aquaculture as an alternative economic activity. With time, as more fishermen enter the already saturated fishery and the overproduction of salt continues along with the *salinas'* habitual abandonment during the rainy season, the introduction of aquaculture could partially solve these two problems and provide a new protein food source. Aquaculture is, of course, agriculture, but although the crop or harvest would be more familiar to a fisherman, it may be regarded as too passive an activity.

Hopefully information of this nature will be useful in the future to development planners in the area of the Gulf of Nicoya. ●