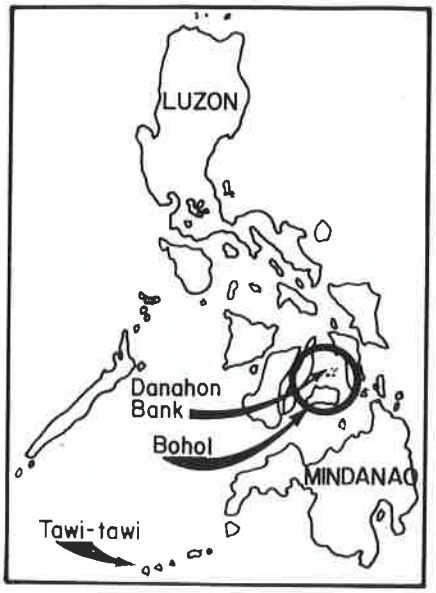
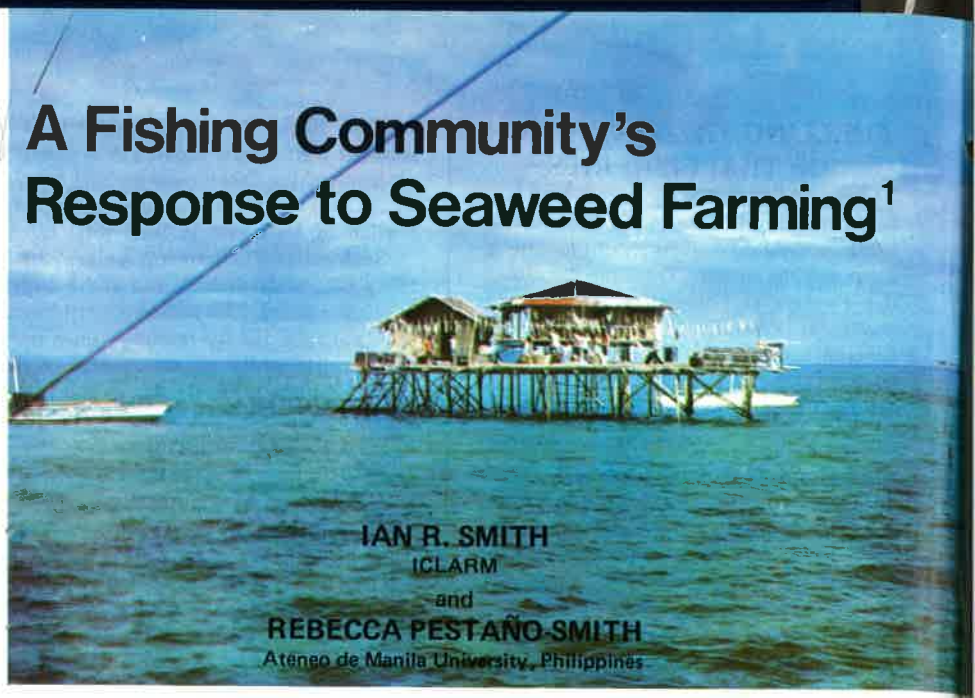


A Fishing Community's Response to Seaweed Farming[1]



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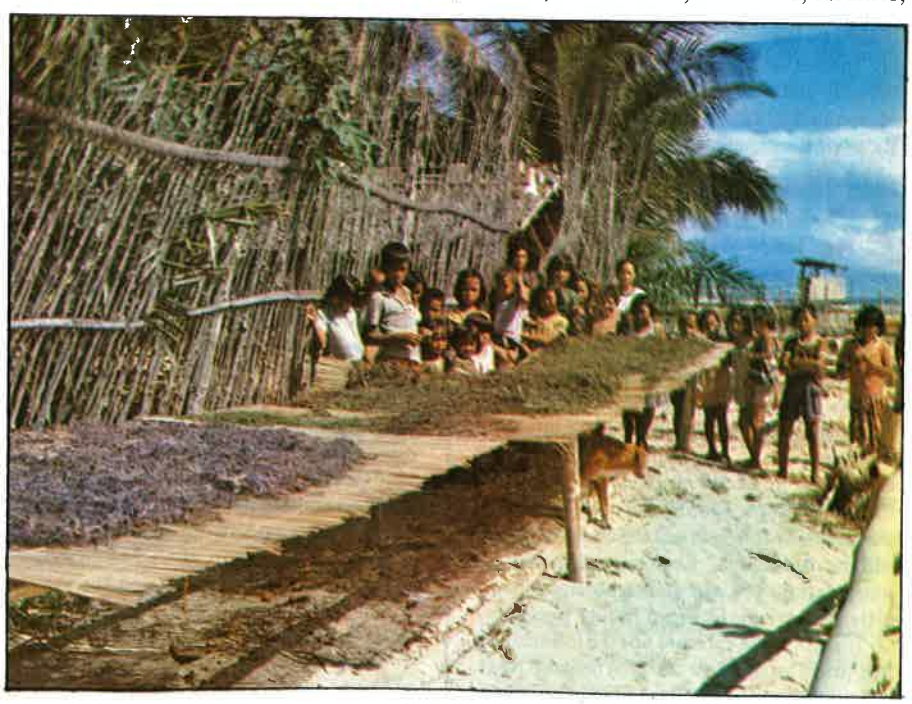
If access to an overexploited fishery resource remains open despite a declining share of the catch for small-scale fishermen, the development of alternative income sources offers the best hope for raising incomes in fishing communities. This paper examines the transition of a fishing community of Hingotanan, Philippines, from almost exclusive dependence on capture fishing to extensive involvement in seaweed farming.

The Fishing Community

Hingotanan Island is located approximately 7 km northeast of the municipality of Talibon, on the island of Bohol in the Central Visayas region of the Philippines. Populated by approximately 340 households, this isolated community has traditionally depended almost exclusively on fishing for its livelihood, using hook and line, various forms of gill nets, small purse seines and stationary corrals, to catch a wide variety of reef species—squids, siganids, crabs, round-scads, anchovies, sardines, and larger pelagics such as tunas, barracudas and mackerels. Other sources of livelihood come from copra making, the residents of the island generally leasing coconut plantation areas from absentee landowners.

[1]Condensed by the authors from Smith, I.R. and R. Pestaño-Smith. 1980. Seaweed Farming as Alternative Income for Small-Scale Fishermen: A Case Study. Paper prepared for the Indo-Pacific Fishery Commission Symposium on the Development and Management of Small-Scale Fisheries. Kyoto, Japan, 21-23 May 1980.



Top: Farmhouse perched over a seaweed farm, Danahon Bank. The platform around the house is used for drying seaweed.

Left: Seaweed is also sun-dried in Hingotanan Island. Drying takes 2-3 d.

Above: Newly-harvested *Eucheuma* branches, length 30 cm. Some farmers harvest prunings like these; others gather whole plants and reattach new seed plants.

Since the early 1970s, Hingotanan fishermen have experienced declining catches and incomes. According to residents, trawler activity, coupled with the initial large number of small-scale fishermen in relation to the fishing area, the predominant practice of dynamite fishing and use of illegal-sized nets by trawlers and small-scale fishermen alike, have considerably reduced the catch in the area.

The introduction of seaweed farming as an alternative source of income for Hingotanan has been considered by many residents as a phenomenon that "saved" their barrio.

Effects of Seaweed Farming

In contrast to many development efforts, seaweed farming in the Philippines evolved from initiatives taken by the private rather than the goverment sector. The search for suitable *Eucheuma* farming sites by various private companies, particularly Marine Colloids, Philippines, Inc., has been going on for over a decade. In the early 1970s the Tawi-Tawi area of the southern Philippines became the first major producing area of farmed *Eucheuma cottonii* and to a lesser extent, *Eucheuma spinosum.*

Eucheuma had for many years been gathered from the wild in Indonesia and the Philippines, but it is only in the Philippines that farmed *Eucheuma* has been successful on a large scale. In Indonesia and Sabah, farming remains a largely experimental endeavor.

The Danahon Bank, northeast of Bohol, also proved ideal for seaweed farming. Indeed, wild *Eucheuma cottonii* had been harvested off the same reef for at least the preceding decade. The sandy bottom is not exposed at low tide and the current flow provides conditions suitable for cultivation of both *E. cottonii* and *E. spinosum.*

After the development of a small experimental *E. spinosum* farm by Marine Colloids, and the promising example set by the corporate farm of Genu Products, a subsidiary of Copenhagen Pectin of Denmark, expansion by former fishermen from Hingotanan was rapid. Marine Colloids deliberately encouraged, by price differential, the farming of the slower growing, more valuable *E. spinosum,* since the company required the iota carrageenans derived from that species. Through lease arrangements secured from the Bureau of Fisheries and Aquatic Resources (BFAR), individuals were granted the rights to farm a maximum of one hectare of reef area each.

In mid-1978, there were only a handful of seaweed farms on the reef. By the end of 1979, fully one-third of the community was engaged in seaweed farming. Over 200 ha were in production and 89 farmhouses dotted the reef. Moreover, BFAR had over 150 additional hectares under application.

Baby purse seiners, like the one above, previously produced a major share of Hingotanan village income.

Investment and annual operating costs for a 1-ha *E. spinosum* farm are not low. An intensively operated farm requires initial capital outlay of US$2,645 and annual operating capital of $4,640. An extensively operated farm (30% of area used) requires $2,015 and $2,200 investment and operating capital respectively.

How then did over 100 fishing families in Hingotanan raise sums of $4-7,000 each? In actuality, each seaweed farmer began on a much smaller scale, incurring initial expenses that were not significantly higher than those incurred for fishing. The $135 capital outlay for the BFAR lease (bond) was the major barrier to entry, not the farmhouse expense nor the seed plants for the farm. The former could be built at a later date when revenue began to accumulate from harvested seaweed; the latter could be borrowed from other farmers or from the major seaweed buyers, most of whom were ready to extend credit to assure later supply.

Initial capital outlay for most families was approximately $800 to cover monoline, stakes, hand tools, baskets, lease, seed plants and tying materials. All labor was family supplied at this early stage. The first harvest came 75-90 d later, and then averaged 650-700 kg/mo thereafter. Prices received were as high as $0.58/kg, so the initial capital outlay was repaid within 6 mo. An extensively operated farm producing 8 t/yr of dried *E. spinosum*, would return a total annual revenue of $4,640 or $1,100 over annual production costs including depreciation and family labor valued at its opportunity cost of $2.70/d. An intensively operated farm was even more profitable, giving a total annual revenue of $11,600 or $4,400 over annual production cost. The breakeven price was $0.44/kg and $0.36/kg for the extensive and intensive operations, respectively.

It is not difficult to see how families, though starting their farming operations on a small scale, were able to pay off previous debts, build farm houses, buy bancas and modern appliances such as television, gas stoves and refrigerators, construct new homes, and send their children away to school. And all this occurred within one year of starting seaweed farming.

The rapid transformation in Hingotanan is also apparent by the large number of concrete houses in various stages of construction and in the more optimistic attitudes of the seaweed farmers. Whereas fishing incomes had earlier averaged $2.70/d, seaweed farming incomes ranged from $5.40-$17.50/d. Moreover, and perhaps more

importantly, income from seaweed farming was more certain and not subject to the unpredictability of environmental factors.

The benefits from seaweed farming have also spread beyond the farm operators. Gathering seaweed that drifts from the farms, making tying materials or working as laborers on the farms of others, were all important sources of income for those who were not themselves farming.

The entrance of so many families into seaweed farming has also led to a reduction in fishing effort on the part of Hingotanan residents. Since 1978, fish prices on Hingotanan have tripled from an average $0.27/kg to $0.81/kg at the end of 1979, due in part to the lower supply.

Although the catch of those remaining in fishing continues to decline, the prevailing prices have maintained fishing incomes at higher levels than would have been possible had no fishing effort been diverted to seaweed farming.

Income Distribution

However, there is another perspective to the present situation in Hingotanan. While benefits from this new economic activity promoted by the private sector have definitely accrued to the participants in seaweed farming, these benefits have not been equitably distributed in the community. There are still full-time small-scale fishermen on the island. Because of lack of capital, particularly the bond for lease rights, these fishermen could not gain entry into the mainstream of seaweed farming. Their present marginal position is reflected in their physical isolation from the community center, living in run-down bamboo and nipa huts and displaying the lack of basic necessities and amenities.

Neither has there been effort by the community itself to manage seaweed farming as a community endeavor. Had farming been controlled by the community rather than individuals, the benefits could have been more equitably distributed, instead of leading to a situation where benefits are likely to be transitory for the majority of Hingotanan seaweed farmers.

Evolving Trends and Future Directions

The 200 ha of farms on Danahon Bank produced in excess of 350 t of dried *E. spinosum* in one month alone, November 1979, equal to the annual production of the entire country only 2 yr earlier. This high level of production has driven prices down to the point that they no longer cover production costs. Hingotanan producers are thus encountering the same boom and bust cycle experienced by Tawi-Tawi seaweed farmers in 1974-1975. Then as now, buying stopped for a period of time until the excess supply could be sold on the international market.

The farmers have adopted numerous strategies to deal with this declining profitability. Since a major operating expenditure is for fuel to travel between Hingotanan and the farm sites, many families are moving out to their farmhouses on a semi-permanent basis; hired laborers are being dismissed and replaced by family labor; families operating more than one hectare, by registering leases in the names of several different family members, are taking advantage of economies of scale in farmhouse and transportation costs to maintain their farm's profitability. Others will perhaps switch to the faster growing *E. cottonii.*

Nevertheless, there is a growing concern in the community that many families will not be able to survive the current downturn in the seaweed business. Even prior to the recent price decline, prosperous entrepreneurs from Cebu and Leyte began investing in seaweed farming. Because of their more substantial assets, these absentee farmers will probably be in a better position to weather the period of lower prices, such that the seaweed farming sector is likely to pass into the hands of fewer persons.

Feelings of frustration are now very apparent in Hingotanan, as farmers observe that for the first time, seaweed farming gave them a sense of control over their lives, but now, with the rapid decline in prices, the old concerns of lack of security and difficulty in providing for one's family have returned. Already some farmers have reverted to full-time fishing.

Could the over-production problem have been avoided? The essentially 'laissez-faire' approach to development of the new industry meant that no attempt was made either by government or community to control the number of hectares in production or the resulting supply, and the industry is following the same overexpansion that characterizes many new economic endeavors faced with a limited market.

Certainly, given the earlier similar experience in Tawi-Tawi of a boom and bust cycle, the events of the last 3 mo of 1979 in Hingotanan could have been anticipated.

While the private sector has played an invaluable role in promoting seaweed farming, and fishermen have enthusiastically responded, it is apparent from Hingotanan's experience, and that of Tawi-Tawi before it, that it is not sufficient to simply introduce a more profitable alternative to capture fishing in order to raise income levels and standards of living in fishing communities. If such communities are to benefit on a long-term basis from the new activity, it is probably necessary to preserve that activity for former fishermen through legislative means. Moreover, if the concern is for equitable distribution of benefits within such communities, some basis for cooperative or community management of the activity that reduces entry barriers and distributes benefits on the basis of participation, must be found and promoted.

Further Reading

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