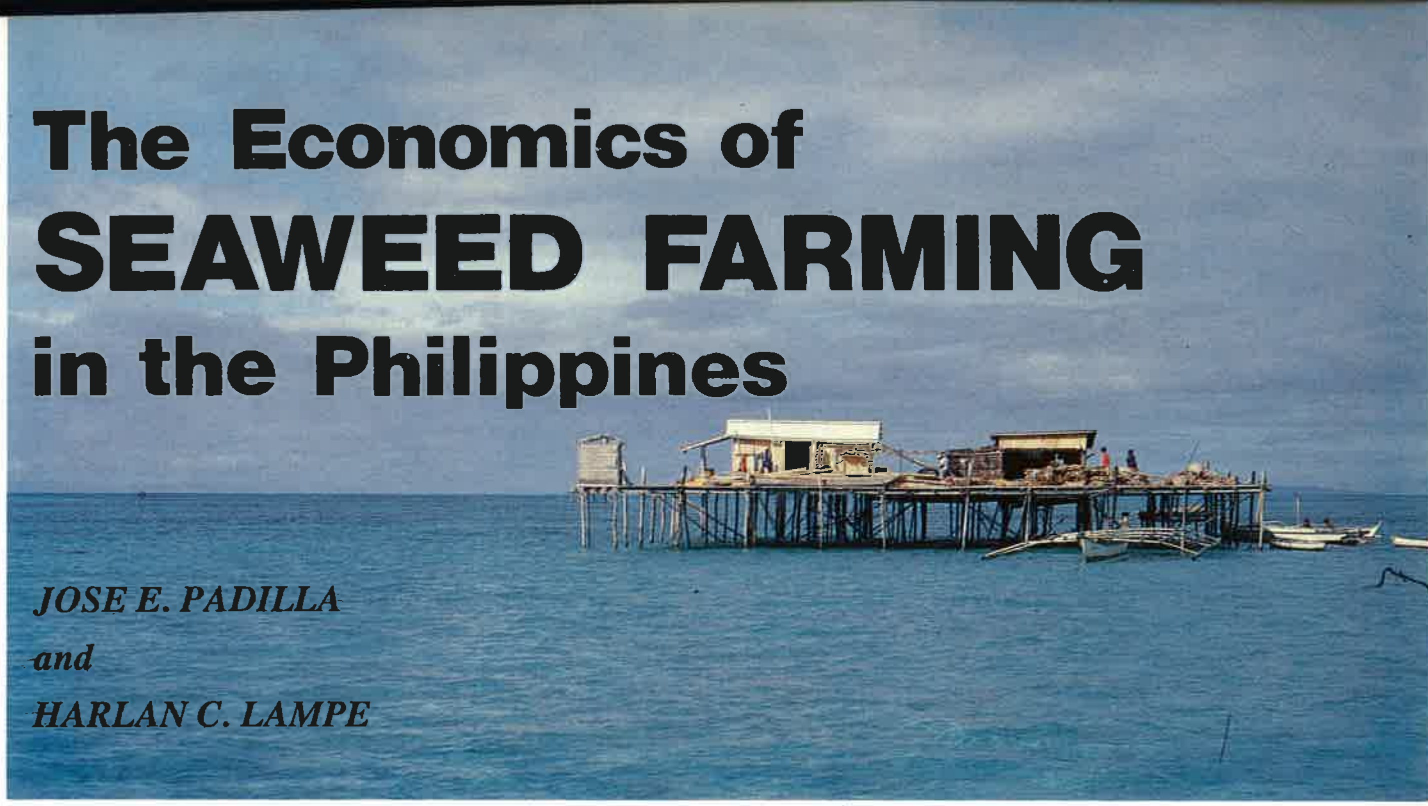
The Economics of SEAWEED FARMING in the Philippines

JOSE E. PADILLA

and

HARLAN C. LAMPE



IAN R. SMITH

A seaweed farmhouse in Bohol, Philippines

In the Philippines, the commercial domestication of seaweeds started in the late 1960s. Since then, *Eucheuma* farming has been an attractive employment alternative for fishermen and a source of valuable foreign exchange.

Over the years, exports of seaweed and its products have increased dramatically (Fig. 1). In 1970, 318 t of seaweeds valued at US$0.092 million were exported; while in 1988, the estimate was 50,000 t at US$40 million.

Why the sudden surge in seaweed production?

A large part of the long Philippine coastline is ideal for seaweed farming. Two *Eucheuma* species, *E. cottonii* and *E. spinosum,* are commercially cultivated in Tawi-Tawi, Sulu, Zamboanga del Sur, Sacol Islands, Palawan, Cuyo, Danajon Reef of Central Visayas and southern Leyte, and more reef areas are being eyed.

The spread of seaweed farming has been largely initiated by the private sector, which has also developed appropriate technologies for *Eucheuma* farming. Multinational companies have designed strategies for the wide acceptance of seaweed culture among fishermen. According to reports, at least one company on the Danajon Reef has a contract farming scheme where the provision of farm inputs is tied up with the marketing of the produce. Such a scheme relaxes the capital shortage faced by most farmers.

As the seaweed output market has only about five major buyers, some forms of nonprice competition have emerged to the benefit of the farmers. In the Danajon Reef, Marine Colloids Philippines, Inc. (MCPI) built a storm-proof research station-cum-farmhouse. Farmers in the area avail of the farmhouse facilities for free; they lodge, cook meals and perform preplanting and postharvesting activities. These developments in seaweed farming, which could have occurred in other areas as well, augur well for farmers as they remove some barriers to farmer entry.

The lure of seaweed farming to prospective farmers is economic. It is an attractive alternative to fishing. This article outlines developments in seaweed

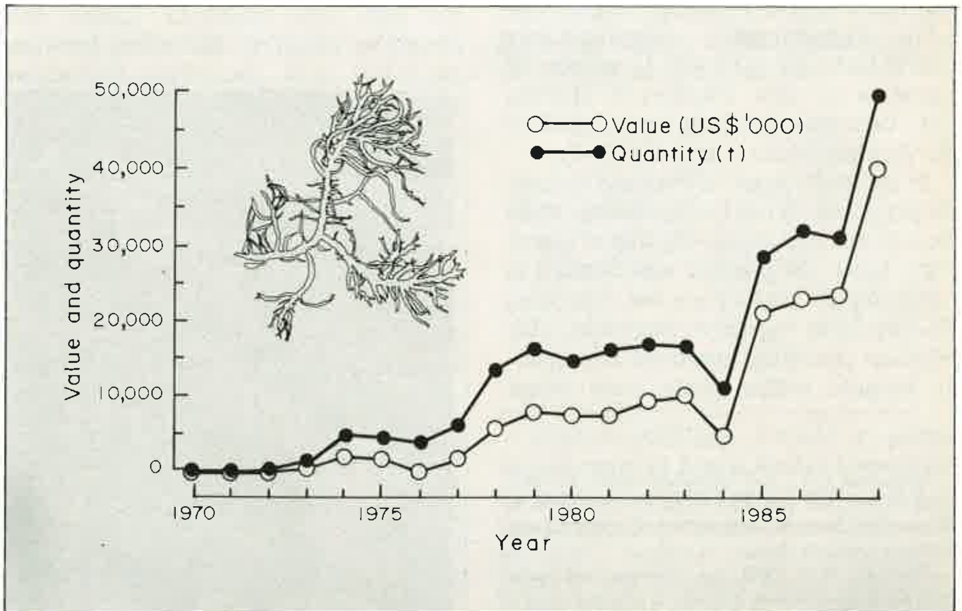


Fig. 1. Philippine seaweed exports increased dramatically from 1970 to 1988

JOSE PADILLA

Sun-drying the mature thalli

farming as described by Guerrero et al. (1980)[1], in a paper covering 1978-79, and by Posadas (1988)[2] who reported its current status.

Seaweed farming is still a high-yielding investment

Technology

The two decades of seaweed culture saw a vast improvement in agronomic practices used by farmers. The primary indicator is the productivity of farms. In 1978-79, the annual yield (dry weight) was 6,272 kg/ha; 10 years later, it was 3,276 kg/ha/month - approximately 36,036 kg/ha for a typical 11 months of operation per year. Changes in planting and harvesting methods contributed to this dramatic increase in productivity.

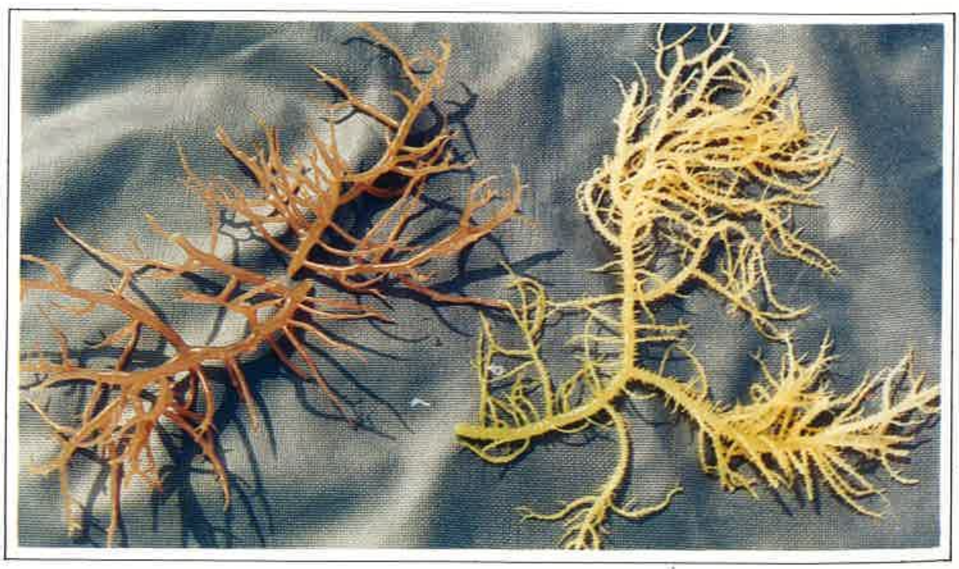
In the early years of seaweed culture, the plant was pruned for harvesting, while the remaining part was allowed to regenerate. Later, the practice was changed to harvesting the entire plant and restocking the farm with vegetative fragments. This selection procedure improved crop quality because mature thalli yield better quality gel and more carrageenan per tonne of seaweed. Also, the dry-weight conversion ratio is higher for mature seaweed. With the new method, plants grow faster as indicated by the shorter 40-day culture period in 1988 compared to about 90 days a decade earlier. The shorter culture period enabled more frequent harvesting.

Another new practice, rotational stocking, streamlined operations. At any given time, a farm has several "month-classes" of seaweeds; harvested lines are immediately restocked enabling weekly, or more frequent, harvesting.

Prices

From ₱1.42 in 1978, nominal farmgate prices per kg of dried seaweeds increased over threefold to ₱6.17 in 1988. In real terms, however, the increase was only 25% using the CPI for western Mindanao as the adjustment factor. Because production data are sketchy, relating the price data to supply may be misleading. But studies have noted that seaweed prices are sensitive to supply fluctuations especially for *E. spinosum.*

Prices for *Eucheuma* seaweeds paid by major buyers in Cebu to traders/middlemen have shown an opposite trend to the movement of farmgate prices. This may imply that marketing margins, at least from farmers to major buyers, have been narrowing. Profit margins of traders are being dissipated; while farmers have been receiving better prices for their produce.



JOSE PADILLA

Commercially cultured Eucheuma *species:* E. cottonii *(left) and* E.spinosum *(right)*

[1] Guerrero, C.V., E.R. Hernandez and L.S. Fabia. 1980. Production and marketing of Eucheuma in Western Mindanao. Bureau of Fisheries and Aquatic Resources, Manila. 22 p.

[2] Posadas, B.C. 1988. An economic and social analysis of the seaweeds industry in selected areas in the Philippines. Asian Fisheries Social Science Research Report. University of the Philippines in the Visayas, Iloilo City. 64 p.

JOSE PADILLA

The storm-proof research station-cum-farmhouse of Marine Colloids Philippines Inc. on the Danajon Reef, Bohol, Philippines

Costs of production

The costs figures between the two periods are disparate due to the more intensive operations in 1988. Hence, comparisons will be on normalized figures, i.e., on per kg basis.

The higher productivity in 1988 was achieved with higher expenses. It now costs ₱1 (in 1978 pesos) to raise a kg of dry seaweed compared to ₱0.56 in 1978. The incremental costs can only be justified by higher profits; it does not make sense for farmers to adopt cost-increasing technologies that squeeze profits. However, data show that profit margins are dwindling (discussed in detail in the next section). The largest increase in costs is attributable to noncash expenses (₱0.40/kg); while there was only a minimal increase in cash expenses (₱ 0.04/kg). (Noncash expenses are primarily the imputed cost of family labor. Actual family labor input was valued at the hired labor wage rate.) Based on cash expenses, the costs of production have not changed much.

Profit margins

The costs and earnings figures show that prices of seaweeds and the costs of production are moving in the same direction. However, the increase in output prices lagged behind the increase in input costs. The profit margin per kg of seaweed is shrinking, although the decrease is not appreciable. In absolute amounts, however, annual net profit per farm or per unit area has increased considerably. Again, this was due to a dramatic increase in cropping intensity over the years.

Because of the disproportionate increases in unit prices and unit costs, the return on investment declined. Nonetheless, the return at 78% per annum is way above the opportunity cost of capital. Seaweed farming is still a high-yielding investment. Another attraction of seaweed farming is that, on a cash accounting basis, the net returns have increased, especially for noncorporate farmers. These farmers, ordinarily fishermen, do not impute costs for their labor contribution to the farm or for their entrepreneurial skills. For such fishermen, only the cash capital outlay has a measureable opportunity cost. They must then perceive that the profitability picture of the industry has improved over the years since the level of investment per unit output is lower; it is less the imputed cost of family labor.

What the future holds

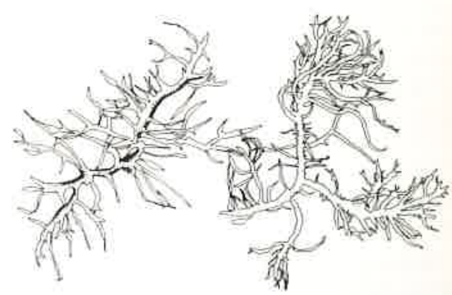
Let us attempt to make a prognosis on the future of seaweed farming. The above normal profits derived from seaweed production invite more firms to engage in this activity. The industry must then expect increases in production from two sources: from more intensive operations of existing farms and the establishment of new farms. In fact, a nationwide survey has already identified new sites for seaweed production. Increases in foreign production, particularly from Indonesia, will also affect the local seaweed industry.

In the near future, production expansion is likely to outpace demand expansion. Should this happen, a question arises: how will farms fare with the inevitable decrease in output prices? In 1988, returns from operations were still attractive. On an annual basis, the return on investment was 78%. This is below that in 1978-79 but still above the opportunity cost of capital. For seaweed farmers, the capital may be used to finance fishing operations as most of them were once fishermen or are still part-time fishermen. Their continued farming of seaweeds indicates that it is a better alternative.


JOSE PADILLA

Seaweed processing is a family affair. Here mature thalli are separated from the vegetative fragments which are then tied to lines.

For seaweed farming to remain profitable, it must at least return to the farmer the opportunity cost of capital. For the sake of argument, let us assume that the opportunity cost of capital is 15% per annum. From the 1988 figures, a downward pressure on profits can still be tolerated by the industry. A 15% return is equivalent to a seaweed price of ₱4/kg. Hence, a decline in the nominal price of seaweed of more than 35% of the current price (₱6.17), *ceteris paribus*, would make the crop unattractive. In terms of cost of production, a unit cost of ₱5.36 or an increase of 54% over the 1988 figure (₱3.47) will also reduce returns to 15%, assuming other things constant. Thus, it appears that presently the industry is able to absorb a wide range of output price and input cost shocks; seaweed production in the Philippines is still resilient.



JOSE E. PADILLA, a Ph.D. candidate in economics at Simon Fraser University, Canada, is currently based at ICLARM to conduct his dissertation-research through an IDRC training grant; HARLAN C. LAMPE was formerly with ICLARM as coordinator of the Asian Fisheries Social Science Research Network.