

## MILKFISH BRACKISHWATER POND CULTIVATION: A CASE STUDY OF *TAMBAK BANDENG* IN “SUMBERSARI”

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### ABSTRACT

*Milkfish brackishwater pond (tambak bandeng) in “Sumbersari” can be divided into three types: (a) fry pond; (b) brackishwater pond type 1; and (c) brackishwater pond type 2. Milkfish brackishwater pond cultivation is profitable, especially when the area is large. The idea of cultivating giant tiger shrimp (udang bago) in the brackishwater pond by using a mixed (campuran) method appears to generate considerable additional income for those who practiced it.*

**Keywords:** Brackishwater pond; fish cultivation; coastal village.

### I. INTRODUCTION

In Sumbersari, as in many other coastal areas of north-Java and Southeast Asia, the undifferentiated raising of milkfish in brackishwater pond (*tambak bandeng*) is the most conventional and longest established method of *tambak bandeng* cultivation. The size of the pond ranges from less than one to more than six hectares, depending on the farmer's land and preference. The average size of *tambak bandeng* operations in Sumbersari was between 1.5 and 3 ha per unit; very rarely Sumbersari peasants held 5 ha or more in one unit.

As I discussed earlier (Kistanto, 2000) brackishwater pond cultivation (*tambak bandeng*) in Sumbersari can be divided into three types: (a) fry pond, smaller pond which is locally called *tambak ipukan*; (b) brackishwater pond type 1 used to raise fingerlings (*glondong*) to adult milkfish (*bandeng dewasa*) ready for the market and consumption; and (c) brackishwater pond type 2 used to rear fry (*nener*) through fingerling (*glondong*) to

adult milkfish (*bandeng dewasa*) ready for the market and consumption.

### II. FRY POND

Fry pond (*tambak ipukan*) is designed for nursing milkfish fry (*nener*: 1-1.5 centimetre) to fingerling (*glondong*: 7-10 centimetres) which takes three to six weeks from stocking. The major goal in cultivating fry pond is to maintain the fry-to-fingerling survival rate as high as possible. Fry ponds in Sumbersari, or precisely at sub-village Banyubiru, are relatively small in size (450-1500 square metres) and shallow (60 to 130 centimetres). It is a recent introduction but its cultivators are increasing.

In Sumbersari fry ponds are located right in or very close to the beach, extending along the coast line of Banyubiru subvillage (the only area for this type of pond in Sumbersari) except for a portion which belongs to the plywood factory. Banyubiru beach fry ponds are

ideal for nursing *nener* to *glondong*. Their location is appropriate to adapt fry newly caught in the sea to the new water environment which in Banyubiru directly flows from the sea to the pond.

### 2.1. Occupants and Cultiva Tors

Bandu, 38, a high school graduate and the vice chairman of the *Kelompok Petani Nener* (Fry Farmers Association) of Summersari, is a married man with four dependent sons. His main source of income is from *tambak ipukan*, but he was also an agricultural produce middleman, a shrimp agent, a building labour contractor, and formerly, an *ojek* (motorcycle taxi) driver. He was also a seasonal contractor and supervisor of jelly fish cleaning labour (mostly women) in the beach area. The following discussions are taken from my interviews with this gentleman.

"Who made the first *tambak ipukan* here?" I asked Bandu at his house one night.

"I did it in 1982," he replied spontaneously, "with the late Zain (who died in 1988)."

"What was the procedure?"

"One day in 1981 I went to Gresik (East Java). I saw in the coastal area, but not close to the beach, *tambak ipukan* was used for rearing *nener* to *glondong*. I was extremely interested in such *tambak* that I had never seen before. In one day I learnt how to develop *tambak ipukan* from one *ipukan* farmer there. Then, I tried to develop such *tambak* here in Summersari. They appeared to be successful, even more successful than the ones cultivated at Gresik."

"Why more successful?"

"Because only about 70 to 80% *nener* survived to *glondong* stage at Gresik, while here about 80 to 95%"

"Why so different?" I asked eagerly.

"At Gresik the *tambak ipukan* were not located as close to the sea as those cultivated here. *Tambak ipukan* here are right behind the Java sea, so that sea water

directly flows into *ipukan* compartments, while in Gresik the water was fresh. The soil at Gresik was more muddy, while here it is more sandy which is good for rearing *nener* to *glondong*."

"Do such conditions influence the growth of *nener* to *glondong*?"

"I am convinced. At Bandengan area (about 10 kilometres from Summersari to the west), for instance, my friend tried to cultivate *tambak ipukan* but failed - he only maintained a 40% survival rate of *nener* to *glondong*. He only cultivated two crops and became bankrupt. The *ipukan* cultivation business will only be profitable if the survival rate is more than 60%, at least 70%, otherwise you lose, not only money but also energy. Moreover, even though the location of *tambak ipukan* at Bandengan is close to the sea, the soil is very muddy and that is good only for growing *glondong* to *bandeng* (adult milkfish). Regular *tambak* with muddy soil is no good for *nener* cultivation. For *nener* nursing to *glondong* stage, the soil must be sandy and the water directly flowing from the sea."

"It seems to me that you have no constraints in cultivating *tambak ipukan*. Is that right?"

"*Tambak ipukan* cultivation here is profitable. But we do not have much finance for development. Unfortunately banks do not understand this profitable business. They do not believe that *tambak ipukan* cultivation promises much for farmers like myself. From *tambak ipukan* cultivation I can get a profit of up to Rp. 500,000 a month. We need finance but they do not trust us, because they only see in a short visit the physical form of *tambak ipukan* which looks so trivial. How can we make them believe if they never observe the details of our profitable business; they never want to hear our detailed explanations of this business."

"Did you seek a bank loan?"

"Yes, I did. I already tried to get a loan from several banks; I went to banks at the regency town, at provincial city, even at

another city, but the result was zero. They did not believe my explanation, but they did not intend to look either," he replied in a high pitched tone, then continued: "only once I got 1 million rupiah from the *Bank Perkreditan Rakyat* of the district town - but that was not enough for business development. That was only because I was supported by a statement from my friend who knew about *tambak ipukan* cultivation and bought my *glondong* - he stated to the bank that *tambak ipukan* business was very profitable but the cultivators desperately lacked finance."

"Where do you buy *nener*?"

"Actually there are *nener* in the sea around Banyubiru, but too few for cultivation so we buy them outside," explained Bandu. "To meet the requirements of our regular *tambak* in Summersari we need approximately 750,000 *glondong* in each season (4 to 5 months). The amount of *nener* supplied to our fry ponds here is around 1 million 'tails' per month. These *nener* come from Gresik, Surabaya and Banyuwangi, from the traders, among others, Mui from Lasem, Soleh from Lasem, and Gimam from Juwana, Pati (Central Java) - they bring *nener* here with them."

"Are *glondong* produced here only for local supply?"

"No, not only for the Summersari *tambak*. *Glondong* purchasers come from diverse areas. They come here and make transactions - from Juwana, Jepara, Wedung Demak, and east Semarang in the east; from Bandengan Kendal, Pidodo Cepiring, Weleri, and even Batang, Pekalongan, and Cirebon in the west (of Central Java) - but not from Tegal since they have their own *tambak ipukan*. Sometimes, purchasers also come from areas as far as Indramayu in West Java. We deliver *glondong* to these places by pick-up van."

Although my household survey in Banyubiru lists only nine household heads occupying and cultivating *tambak ipukan* as main livelihood and occupation, the

actual number of those cultivating *tambak ipukan* is greater since many had other main sources of livelihood. The recently established *Kelompok Petani Nener* (Fry Farmers Association) 'Sido Tulus' of Summersari lists 29 *tambak ipukan* occupants and cultivators, but did not provide the size of each *tambak ipukan*.

## 2.2. Size and Price

In cooperation with one local youngman, I made another survey, particularly concerning the size of individual *tambak ipukan*, which covered 18 *tambak ipukan* and their occupants, and measured three of them as samples: The size of *tambak ipukan* in Banyubiru ranged from 450 to 3,000 m. sq., with an average size of 1,000 m. sq. per unit. Almost all of these 18 *tambak ipukan* cultivators lived in Banyubiru. One was from Madura island: this man bought 750 m. sq. of *tambak ipukan* for Rp. 1,250,000 in January 1991, stayed 10 months in Banyubiru and supplied *nener* from Lasem, east Central Java, then sold his *tambak ipukan* for Rp. 3,000,000 before he left Banyubiru for good in early November 1991. In 1992, only one of these *tambak ipukan* was officially registered, Bandu's, which was officially 1,088 m.sq. but which included his brick house.

Lately, more cultivators have become interested in *tambak ipukan* business and the price of ponds has arisen - in some cases very fast. Hasan, who bought 1,500 m.sq. of *tambak ipukan* in 1986 at the price of Rp 2.4 millions, claimed that the present (1991-92) market price of his *tambak ipukan* was Rp. 10 millions. Hajji Abdurrahman, who bought 750 m.sq. of *tambak ipukan* in January 1991 at the price of Rp. 1,250,000, sold it to Sajio for Rp. 3,000,000 after only nine months; while Ngari's 1,350 m.sq. was bought in 1989 at the price of Rp. 1.5 million and was worth of Rp 3.5 to 4 millions in 1992.

In 1992, when many villagers have realized that *tambak ipukan* is profitably promising, the number of *tambak ipukan* occupants increased considerably as reflected in the list of *Kelompok Petani Nener* members. The growth involves those who have other incomes from both agricultural and non-agricultural activities. The rapid growth in the number of *tambak ipukan* cultivators from less than five in mid-1980s to about 30 in 1992 reflects a hope that *tambak ipukan* can be a new livelihood in a situation where agricultural land has become increasingly scarce and the productive capacity of the arable land is becoming more limited as well.

Many *tambak ipukan* cultivators have been successful; Banyubiru is ideal for *nener-glondong* cultivation and there is a nearby market for the *glondong*. But cultivating *nener* in the *tambak ipukan* requires skill, care and diligence: not a few have failed during the harsh, long, hot season. As Tohari lamented in August 1991: "The season is worse this time. I can not cultivate my *tambak ipukan*, so I do not get any income from it" - but Tohari was lucky because his married daughter and son-in-law, who both work in the plywood factory, could help with their factory wages when the household is in such a bad situation. Successful *ipukan* farmers, even though the floor of their house was still dirt, enjoyed their considerable profits and bought new colour TVs, late model motor vehicles, and improved their farm equipment. However, in the world of agriculture where nature plays an important role, nothing is quite certain. There were often social and economic pressures as well.

The first house in the *tambak ipukan* area, the house owned by Bandu, was built in 1988, but since 1989 the

number has been growing fast. In April 1992, there were twenty three houses in that area - all officially registered through a national land scheme called *Proyek Nasional* or *Prona* (National Project). Almost all had walls of bamboo or simple timber, with clay roof tiles and floors of dirt. The inhabitants were mostly agricultural labourers. Bandu's brick-house with cement floors stood out from the others.

In spite of the fact that only one of the *tambak ipukan* in Banyubiru was officially registered, the land has become increasingly valuable. In the early 1980s, when many people considered *tambak ipukan* was a trivial and unprofitable business, there were only two or three villagers involved. Sajio, the farmer who helped me count the houses in the *tambak ipukan* area, repeatedly stated, "formerly no one wanted that land; now it is precious." He added that, "those who built houses in 1989 and 1990 had to pay Rp. 200,000 to Rp. 300,000 to Bandu" - presumably for a house certificate, which was issued in 1991.

### 2.3. Input-Output

*Tambak ipukan* can be very profitable as the data set out in **Table 1** indicates. My summary shows that the average stocking of 22,000 *nener* at a total price of Rp. 1,430,000 is reared for about 4 weeks with an 82% survival rate and is sold for Rp. 2,218,920. From this gross return the following costs of Rp. 335,000 must be deducted including *nener* counting (Rp. 10,000); night guard (Rp. 20,000); harvest work (Rp. 20,000); transportation (Rp. 75,000); selling agent (Rp. 110,000); and unexpected costs (Rp. 100,000). The net profit therefore is Rp. 453,920.

Table 1. Input-Output of *Tambak Ipukan* Per Stocking [4 to 5 weeks], 1990-92

	Highest	Lowest	Average
Amount of <i>nener</i> purchased	31,000	13,000	22,000
<i>Nener</i> price per 1,000	Rp. 90,000	Rp. 52,000	Rp. 65,000
Total <i>nener</i> price	Rp. 2,790,000	Rp. 676,000	Rp. 1,430,000

Glondong price per 1,000	Rp. 155,000	Rp. 100,000	Rp. 123,000
Survival rate □	92% (28,520 □glondong)	55% (7,150 □glondong)	82% (18,040 □glondong)
Total return	Rp. 4,420,600	Rp. 715,000	Rp. 2,218,000
Total costs	Rp. 3,262,000	Rp. 874,000	Rp. 1,765,000
Net profit	Rp. 1,162,600	- Rp. 159,000	Rp. 453,000

But the data in **Table 1** also indicate the risks and uncertainty involved. The lowest survival rate I recorded was 55%. 13,000 *nener* were cultivated producing 7,150 *glondong*, sold for Rp. 715,000. But the total costs were Rp. 874,000 - thus the loss is Rp. 159,000. The highest survival rate was 92%: 31,000 *nener* produced 28,520 *glondong* sold for Rp. 4,420,600, the total costs were Rp. 3,262,000 - so the net profit was Rp. 1,162,600.

### III. MILKFISH BRACKISHWATER POND AND MIXED POND

Milkfish brackishwater ponds (*tambak bandeng*) in Summersari are commonly divided into milkfish brackishwater pond type 1 and milkfish brackishwater pond type 2. Milkfish brackishwater pond type 1, designed for the cultivation of milkfish fingerlings to adult size, is relatively recent and emerged in conjunction with *tambak ipukan*. Before the early 1980s, all milkfish brackishwater pond in Summersari were milkfish brackishwater pond type 2 used for the entire process of cultivation from fry to marketable size milkfish. To adapt to the milkfish cultivation cycle, the arrangement of these two types of *tambak* is slightly different: compartments of *tambak bandeng* type 1 are not provided with sections for a fry to fingerling rearing unit. *Tambak bandeng* type 1 can produce two or three crops - but generally two crops - a year; *tambak bandeng* type 2 two crops a year.

In both types of *tambak*, *penaeus merguensis* (locally termed *udang putih* or

white shrimp) are always involved. They are not stocked, the marine tidal stream generously brings them through the sluice. For most *tambak bandeng* cultivators, *udang putih* is economically important; many even considered *udang putih* as the major product of *tambak* since they catch them every day and provide a good daily income to the *tambak* owners. A bamboo trap (*posong*) is set each night to trap fish and shrimp entering *tambak* with the tide water. One indication of the commercial value of the practices is that specialized traders and agents initially emerged in Summersari to distribute and market what they called *udang* (Indonesian) or *urang* (Javanese) *harian* which literally means 'daily shrimp'.

A more recent phenomenon in Summersari is *tambak udang bago* (giant-tiger shrimp brackishwater pond) and *tambak campuran* (mixed brackishwater pond). *Tambak udang bago* is specially designed for giant-tiger shrimp cultivation and, depending on the level of technology such as the feeding system, requires more careful cultivation, more skilled labour as well as more capital, than other types of *tambak* cultivation; but the price of tiger shrimp is higher than milkfish. *Tambak campuran*, designed for mixed cultivation of milkfish and giant-tiger shrimp, is rather different from regular *tambak bandeng* types, especially in terms of its depth and feeding system. This type of *tambak*, however, can be regarded as a development of regular *tambak bandeng* with the purpose of increasing agricultural income by adding giant-tiger shrimp fry into the *tambak*. Both *tambak udang bago* and *tambak campuran* usually accommodate two crops a year.

#### IV. COSTS AND RETURNS

**Table 2** summarizes the details of four crops from *tambak bandeng*. It certainly shows that *tambak bandeng* is profitable, especially when the area is as large as five ha like the one operated by "A" (male household head). Even when the area is as small as the 1.5 ha owned by "D" (single female household head), *tambak* could be the main source of income for a household which consisted of a single mother and her three daughters who all went to schools. In the case of "D", who sold her fish when they were still in the pond (contracted), the amount and price of the fish per kilogram were not known; moreover, she did not even get a return from the trash fish (fish other than

*bandeng*). It is apparent that both the size and the cultivation methods of *tambak* play a significant role in the production of daily shrimp: a smaller *tambak* which was less cared for, such as the one owned by "D", produced less daily shrimp than the other three larger and well cared for ones. Due to *bandeng* price fluctuations, "B" (male household head) sold his milkfish for a better price (Rp. 2,500 per kilogram) than the other two "A" and "C" (male household head) (Rp. 2,000 per kilogram).

The idea of cultivating giant-tiger shrimp in the *tambak bandeng* by using a mixed (*campuran*) method appears to generate considerable additional income for those who practiced it. In three cases presented, the farmers could at least triple their investment in the giant-tiger shrimp fry.

Table 2. Costs and Returns of *Tambak Bandeng* & *Tambak Campuran* One Crop, 1990-92

Methods	"A" <i>Bandeng</i> (monoculture)	"B" <i>Campuran</i> (polyculture)	"C" <i>Campuran</i> (polyculture)	"D" <i>Campuran</i> (polyculture)
<b>Tambak Size and Status</b>	5 ha/owned (well cared for)	3.5 ha/rent (well cared for)	2 ha/owned; 2 ha/rent (merged and well cared for)	1.5 ha/owned (less cared for)
<b>Costs (Rp)</b>	<b>861,000</b>	<b>1,672,500</b>	<b>2,020,000</b>	<b>210,000</b>
□Total□Milkfish fry□Fingerling□Tiger-shrimp fry	5,000 x 60 = 300,000	3,500 x 125 = 437,500	4,000 x 130 = 520,000 20,000 x 10 = 200,000	1,000 x 100 = 100,000 5,000 x 11 = 55,000
□Tambak rent	-	20,000 x 10 = 200,000	1,200,000	-
□Labour, etc	-	1,500,000/2 = 750,000	700,000	55,000
	561,000	285,000		
<b>Returns (Rp)</b>	<b>3,000,000</b>	<b>3,450,000</b>	<b>3,865,000</b>	<b>1,030,000</b>
Total Milkfish	1,000 x 2,000 = 2,000,000	900 x 2,500 = 2,250,000	1,000 x 2,000 = 2,000,000	(tebasan): 600,000
Daily shrimp	about 1,000,000	about 600,000	about 900,000	about 200,000
Tiger shrimp	-	600,000	765,000	230,000
Trash fish (ruchah)	-	600,000	200,000	-
<b>Profit</b>	<b>2,139,000</b>	<b>1,777,500</b>	<b>1,845,000</b>	<b>820,000</b>

Note: In 1992, US\$1 = Rp. 2,000

#### V. CONCLUSION

Based on this study, a conclusion can be drawn as the following

(1). Milkfish brackishwater pond in Summersari can be divided into three types, namely fry pond, milkfish

brackishwater pond type 1, and milkfish brackishwater pond type 2.

(2). As a recent phenomenon, fry pond cultivation has attracted an increasing number of cultivators, but it is not easy to gain a financial loan for its development.

Even though profitable fry pond cultivation involves risks and uncertainty.

(3). Milkfish brackishwater pond cultivation is profitable, especially when the area is larger. Moreover, the idea of cultivating giant-tiger shrimp in the milkfish brackishwater pond by using a mixed method appears to generate considerable additional income for those who practiced it.

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