

AQUACULTURE IN INDONESIA

Toni Ruchimat* and M. Nurhudah**

(*Laboratory of Fish Nutrition, Faculty of Agriculture, Kochi University)

(**Fisheries Education and Training Institute, Jakarta, Indonesia)

I. Introduction

Indonesia has been well known as a wealth country for its fisheries resources of both marine and freshwater origin. It has been estimated that marine fisheries resources could be exploited on a sustainable basis at 6.6 million tons of fisheries product annually. In coast line, which stretched for 81,000 km, has a great potential to be developed for marine culture activities which theoretically could produce fish for amount of 0.81 million tons assuming a rate of production of one ton per year for 10% exploited area. Meanwhile, brackishwater offers area for utilization of 840,000 hectare could produce 1.68 million tons at 10% level of exploitation. By cultivating of reservoir (cage nets), it could produce 0.53 million tons of fish at 1% area of cultivation. Thus, from the last three resources, it could be projected 3.02 million tons of harvesting fish in every year.

Fisheries plays an important role in the economy of Indonesia. It has significantly contributed to food production as a greatest supplier of cheap animal protein source, rural development, income and employment, and to foreign exchange earnings.

There are two main components of fisheries that are being practiced in Indonesia, capture and aquaculture. The capture activity is done in marine and inland open waters, while aquaculture activity is done in marine, brackishwater and freshwater. Total production of fisheries in Indonesia was about 3,349,601 MT in 1991. Of the total production, 15.5% was derived from aquaculture (Table 1).

Table 1 . Fisheries Production in Indonesia (1985-1991)¹⁾

Year	Production (MT)		
	Aquaculture	Capture	Total
1985	304,571	2,090,991	2,395,562
1986	334,097	2,195,793	2,529,890
1987	376,772	2,293,641	2,670,413
1988	430,348	2,450,821	2,881,169
1989	466,704	2,568,564	3,035,268
1990	499,825	2,662,644	3,162,469
1991	517,512	2,832,089	3,349,601

Indonesia has long history in aquaculture, dating back to the 14th century when milkfish were reared in the mangrove swamps. Before 1986, virtually all aquaculture practices in Indonesia were

on an extensive or semi - intensive level; cultures of milkfish, shrimp, carp, tilapia, and gouramy. Intensive culture techniques are only applicable when a high market value for the species can make them economical. Now, there are well established culture systems for freshwater fish, brackishwater species such as shrimp, and developing marine finfish culture.

II. Freshwater culture

Several kinds of freshwater fish culture that commonly practiced in Indonesia are freshwater pond, cage culture, and paddy - field. Of these types, paddy - field has the largest area (Table 2).

In freshwater pond culture, the major commodities are common carp, Java carp, barb, mozambique tilapia, nile tilapia, giant gouramy and kissing gouramy. The other species are *Clarias* sp., *Trichogaster pectoralis* (snakeskin gouramy), *Pangasius* sp., snakehead, marble goby and *Macrobrachium rosenbergii*. In paddy - field culture, the predominant species farmed are carp. Tilapia, giant gouramy, kissing gouramy, snakeskin gouramy and *Clarias* are also common in this type of culture. In cage culture, which commonly practiced in lakes and rivers, the main species are snakehead and marble goby.

Of the total production, freshwater pond cultured has always the highest. In 1991, its contributed around 54.98% of the overall freshwater aquaculture production (Table 3).

Table 2. Culture Area by the Type of Freshwater Culture (Ha), 1985-1991¹⁾

Year	Type of Culture			Total
	Freshwater pond	Cage	Paddy - field	
1985	44,778	3	94,309	139,090
1986	46,292	3	97,050	143,345
1987	46,528	2	99,679	146,209
1988	49,037	3	100,501	149,541
1989	52,352	5	101,953	154,310
1990	50,938	7	106,074	157,019
1991	53,824	11	113,731	167,556

Table 3. Freshwater Aquaculture Production (MT), 1985-1991¹⁾

Year	Type of Culture			Total
	Freshwater pond	Cage	Paddy - field	
1985	84,240	746	63,218	148,204
1986	88,734	557	74,449	163,740
1987	95,353	1,879	87,417	184,649
1988	104,187	3,625	89,253	197,065
1989	113,673	4,924	89,616	208,213
1990	120,598	4,481	87,673	212,752
1991	106,862	6,648	80,846	194,356

Intensive culture has been applied in running water pond cultures and cage cultures of common carp, while for other fishes are done in semi - intensive and extensive methods.

III. Brackishwater Culture

The predominant species commonly cultured are shrimp and milkfish. Others are mullet, Tilapia, seabass, barb, and crab. In accordance with the Indonesian government programs in sub-sector of fisheries, the brackishwater aquaculture has been developing continuously. At present, around 50% of the existing ponds are used for milkfish culture, either monoculture or poly cultures with shrimp (especially *Penaeus monodon*). Now adays, shrimp culture is one of brackishwater commodity has been fastly developed.

In Indonesia, brackishwater culture, especially shrimp culture, has been developing since 16 years ago. Culture of black tiger shrimp (*Penaeus monodon*) is widely practised in many provinces, employing all levels of technology, from traditional to intensive system of culture. Shrimp culture location mainly are in West Java, Central Java, East Java, Bali, Aceh, Lampung, South Sulawesi, and north Sumatra.

Since a few years ago, many private sectors have involved in the development of shrimp culture. The most popular species which is cultured are black tiger shrimp and banana shrimp (*Penaeus merguensis*); where both of them have some advantages such as they can achieve a marketable size that bigger than others in short culture period, they can withstand wide environment fluctuations that often occur in brackishwater ecosystem, and good market price.

In intensive shrimp culture, formulated feeds and high stocking density are used, range between 10-50 post larvae per m². With good water management, good feed quality, and apply of aerators, 5-8 tons per ha per crop (4-5 months) can be expected.

The possibilites for further expansion of brackishwater culture in Indonesia, possesses a large potential area. Base on the data from DGF, in 1991, the existed of brackishwater pond was 269,542 ha, while potential area was 1,316,200 ha.

In 1991, total production of brackishwater culture was 323,156 MT, its contributed to 62.44% of total aquaculture production and 9.65% of total fisheries production in this country (Table 4).

Table 4. Brackishwater Aquaculture Production, 1985-1991¹⁾

Year	Production (MT)
1985	156,367
1986	170,310
1987	192,123
1988	233,283
1989	258,491
1990	287,073
1991	323,156

IV. Marine Culture

In accordance to the number of island that spreading all over Indonesia and length of shore lines are vast resources for developing and alternative of marine fish production. In fact, two third of Indonesia is sea in which various aquatic flora and fauna existing interdependence ecosystem. Realizing the potential fisheries resources and the problem faced by fisheries sub sector, the Indonesian Government issued a presidential decree No. 23 / 1983 concerning the development of marine culture which are involved:

- The Indonesian territory is very potential for developing of marine culture
- Marine culture is an afforts for increasing of production and as a measure of ecosystem conservation.

Since then, marine culture has been developed and becoming more important as an alternative of fisheries production. However, they develop faster than the others because, most of the marine culture commodities are export commodities. For example, base on the data from DGF, the production of of some marine fishes which can be cultured such as sea bass, groupers and siganids were increased form 66,142 ton in 1981 to 120,462 ton in 1988 or 10.26% per year.

Further development of marine culture facing the problems of unavailable data of suitable sites, insufficient seed supply, and seasonal seed supply.

Reference cited

- 1) Directorate General of Fisheries, 1992. Indonesia, Fisheries Statistics, 1985-1991 ; 1-50.