

Aquaculture Production in Asia: A Reassessment

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Asia has a long history of fishfarming, yet aquaculture production data from most countries still remain crude estimates. Aquaculturally developed nations such as Japan, China and some Southeast Asian countries had begun collecting aquaculture production statistics after World War II. Most countries in Asia have taken stock of their aquaculture industry only in the last decade. In many countries, aquaculture production statistics are still merged with catch statistics and it is often difficult to segregate them.

During the last decade, the Food and Agriculture Organization (FAO) of the United Nations has compiled aquaculture production data on a global basis from annual returns submitted by various member countries. This information became the basis of depicting world fish production growth through aquaculture.

Overestimation

Published information by FAO indicates that China, Japan, India, the Republic of Korea and the Philippines are amongst the top aquacultural countries. The most recent published data are for 1983, when these countries were reported to contribute 7.6×10^6 t (90.8%) out of Asia's output of 8.3×10^6 t or 74.7% of the world estimate of 10.2×10^6 t (Table 1).

However, recent publications and surveys conducted by the author have all indicated that whilst aquaculture production data in almost all Asian countries are probably reasonable estimates, those from China and India are grossly overestimated; the differences are too large to be ignored.

Taking the latest available data from FAO (1983), China was reported to produce 4.569×10^6 t of aquatic products through aquaculture and India 848,973 t, together accounting for 65% of total Asian and 53% of world production. A recent Chinese fishery publication authored by 201 fishery scientists and 29 editors¹ computed the production in China in 1983 to be 1.973×10^6 t. The FAO overestimation is 2.596×10^6 t or 131.5%. The large discrepancy was due to erroneous entry of seaweed production which should be 241,533 t

instead of 1.381×10^6 t and that of mollusc production computed to be 257,123 t instead of 1.758×10^6 t. The mistake could not be due to wrong entry of landings from the wild as the total seaweed and mollusc production from both the capture and culture fisheries was 261,000 t and 442,518 t, respectively.

World aquaculture
production has been
overestimated by
nearly 50%.

A recent survey conducted by the Indian Institute of Management (1982-1983)² showed that about 106,000 t of fish were produced from 150,000 ha of ponds (including village ponds), 25,000 t from 1.7 million ha of reservoirs and lakes, and another estimated 10,000 t from the 26,000 ha of brackishwater swamps. Total production was thus 141,000 t. This means an overestimation of 707,973 t or 502%.

The total difference of 3.304×10^6 t for both countries alone accounts for an overestimation by 63% of Asian production and by 47% of world production.

Aquaculture Production 1983

Total aquaculture production in Asia in 1983 was in reality about $5.244 \times$

10^6 t (Table 1) rather than 8.396×10^6 t as estimated by FAO. The difference of 3.152×10^6 t brings down the world production figure to 7.058×10^6 t without adjusting the estimates from other regions originally presented by FAO. Despite this adjustment, Asia still contributes the largest proportion, about 75% of world production through aquaculture.

China and Japan together contributed about 60% of Asian production through aquaculture or 44% of world aquaculture production. The developing nations in Asia contributed 4.1×10^6 t or close to 80% of aquaculture production from Asia. Aquaculture provides a very significant contribution to total fish supply in countries such as Nepal (64%), China (36% for mainland, 26% for Taiwan), South Korea (21%), and the Philippines (23%). While aquaculture has helped to raise fish production in Sri Lanka (16%), Bangladesh (15%), Indonesia (12%), Singapore (10%), Malaysia (9%) and Thailand (7%), its contributions to total fish supply in Burma, Pakistan, Hong Kong and India were less than 5% (Table 1).

In terms of commodities, Asia leads the world production of seaweeds (almost 100%), finfish (72%), crustaceans (63%) and molluscs (63%) (Table 1). Japan, South Korea, China and the Philippines account for almost all world seaweed production. The main species are kelp (*Laminaria* and *Undaria*) and red seaweeds (*Porphyra*) in temperate countries, and two red seaweeds, *Eucheuma* and *Gracilaria*, in the tropics. A fairly

Harvesting large carps in the Zin Ann Giang reservoir, Hangchow, China. The Chinese have developed efficient technology for harvesting fish stocked in lakes and reservoirs.



Table 1. Aquaculture production from Asia (1983).

Country	Finfish	Mollusc	Crustacean	Seaweed	Total	Percentage of total fish production	FAO estimate
Bangladesh	114,090	—	—	—	114,090	15.2	112,000
Burma	3,946	—	—	—	3,946	0.6	n.a.
India	131,000	—	10,000	—	141,000	5.4	848,973
Nepal	4,000	—	—	—	4,000	64.5	n.a.
Pakistan	5,004	—	—	—	5,004	1.5	n.a.
Sri Lanka	35,530	—	—	—	35,530	16.2	35,530
Malaysia	16,820	49,462	245	n.a.	66,527	9.0	64,336
Philippines	277,710	29,808	910	132,204	440,632	22.7	440,632
Indonesia	226,000	—	30,000	6,000	262,000	12.0	199,297
Thailand	47,082	115,582	11,474	—	174,138	7.7	102,175
Singapore	861	979	179	—	2,014	10.3	2,039
China (excluding Taiwan)	1,465,639	257,123	8,975	241,533	1,973,270	36.2	4,569,858
China (Taiwan)	151,757	70,653	10,632	9,716	242,758	26.0	242,758
Hong Kong	8,060	60	—	—	8,120	4.3	8,120
S. Korea	1,218	289,704	50	347,227	638,199	21.5	638,199
Japan	269,834	332,000	10,000	521,000	1,132,834	10.9	1,132,834
Asia	2,758,551	1,145,371	82,460	1,257,680	5,244,062		8,396,751
Other continents	1,090,027	674,356	47,832	1,737	1,813,952		1,813,952
Grand total	3,848,578	1,819,727	130,292	1,259,417	7,058,014		10,210,703
Asia (%)	71.7	62.9	63.2	99.9	74.2		82.2

n.a. = not available

large proportion of the finfish produced was from freshwater culture. More than 1.7×10^6 t of freshwater fish were harvested in 1983 by China, Bangladesh, India, Burma, Indonesia, Nepal, Pakistan, Sri Lanka, Japan and Thailand. Most of the production were Chinese and Indian carps. The tilapias are also an important commodity in China (Taiwan and mainland), Indonesia, the Philippines and Sri Lanka. Brackishwater and marine finfish constituted approximately 1×10^6 t mostly from cages (yellowtail, breams, seabass, groupers) and brackishwater ponds (milkfish and mullets). Mollusc production in Asia appears to concentrate exclusively in coastal nations mainly in East and Southeast Asia. In addition to edible oysters (*Crassostrea* spp.) which are the main bivalves cultured in Japan, Korea, China and the Philippines, green mussels (*Perna viridis*) are extensively cultured in most Southeast Asian countries. Malaysia is the world's biggest cockle (*Anadara granosa*) producing country with an annual production of 45,000-50,000 t.

Only about 82,460 t of shrimps and crabs were produced in 1983. About 50% of these, especially shrimps, were produced in Southeast Asia. The main species cultured are tiger shrimp (*Penaeus monodon*) and the banana shrimp (*P. indicus* and *P. merguensis*) in Southeast Asia, Taiwan and India, and kuruma ebi (*P. japonicus*) and the oriental shrimp (*P. orientalis*) in the subtropical climate of Japan and China.

Growth Rate

Over the past two decades or so, "aquaculturally developed and developing nations" have made substantial progress in aquaculture development as proven from the rate of growth of outputs from aquaculture farms. Aquaculture production in Japan increased approximately threefold from 403,000 t in 1961 to 1.3×10^6 t in 1983, with an average annual increment of 33,652 t or a growth rate of 8.3%. Growth has been mainly in mariculture while that for freshwater aquaculture is negligible. In fact, freshwater production through aqua-

culture declined from 138,000 t in 1978 to 117,000 t in 1983, which is about the production level of 1969-1970 (Fig. 1a). On the contrary, freshwater aquaculture

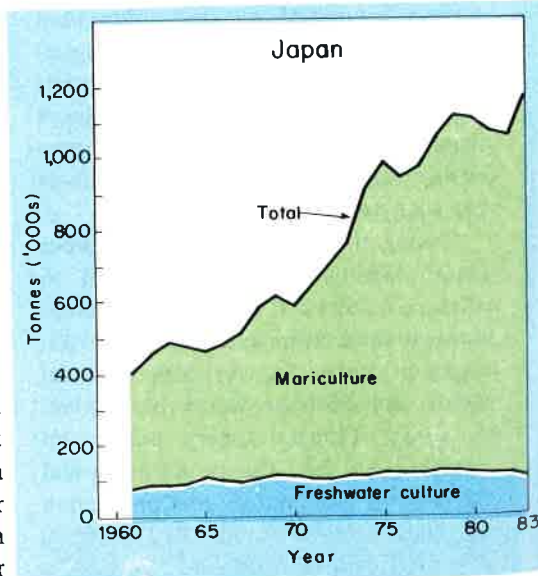
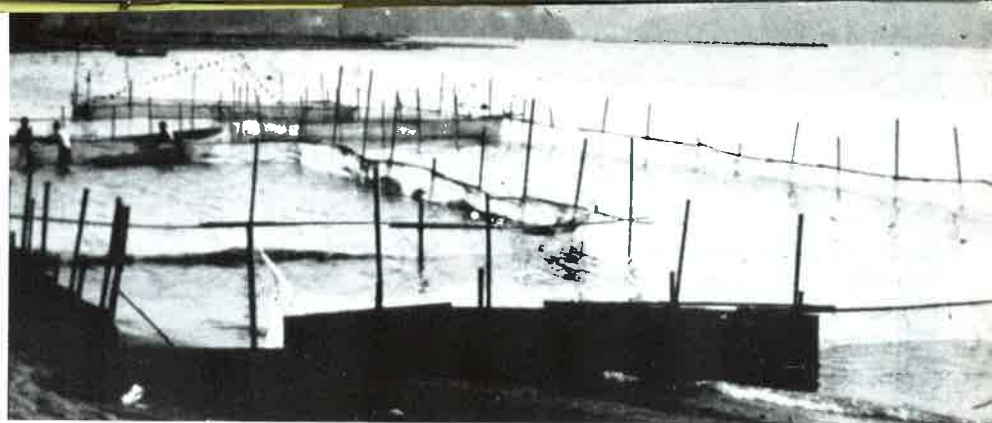


Fig. 1a. Growth rate of Japanese mariculture compared to freshwater aquaculture, 1960-1983.

production in China increased steadily from 1967 to 1978 and thereafter increased at an accelerated rate especially in the 1980s, largely due to the expansion of culture-based fisheries and integrated fishfarming systems. The average annual increment between 1980 and 1983 was 153,750 t (Fig. 1b). Unlike Japan, mariculture production in China is comparatively less significant although total harvest in 1983 was about sixfold that of 1961.

Aquaculture production in Taiwan increased from 68,945 t in 1973 to 242,758 t in 1983. The more than three-fold increase is largely due to the application of intensive farming systems in the cultivation of eels, tilapia, shrimps and oysters. A similar trend was also reported in South Korea where production through aquaculture increased by at least sixfold from 115,040 t in 1973 to 638,199 t in 1983 largely due to higher production of oysters and seaweeds.

Amongst the Southeast Asian countries, aquaculture production has also increased although at a different growth rate (Table 2). While a higher rate had



Simple net enclosure for rearing juvenile fish, Fukui Prefecture, Japan.

Table 2. Harvest of aquatic resources through aquaculture from Southeast Asian countries. Source: government fisheries statistics.

Year	Philippines	Thailand	Malaysia	Indonesia
1971	97,915			138,363
1972	98,923			131,208
1973	99,600			139,402
1974	113,195			146,809
1975	106,461	144,000		164,647
1976	112,761	216,000	33,245	154,642
1977	155,756	253,000	47,885	159,918
1978	201,590	223,000	56,979	171,132
1979	235,777	209,000	64,978	182,492
1980	289,166	147,000	123,002	200,000
1981	339,501	151,129	79,541	241,000
1982	392,348	102,175	75,012	254,000
1983	440,632	174,138	66,527	262,000
Mean annual growth rate (%)	14.83	7.5	16.26	5.63

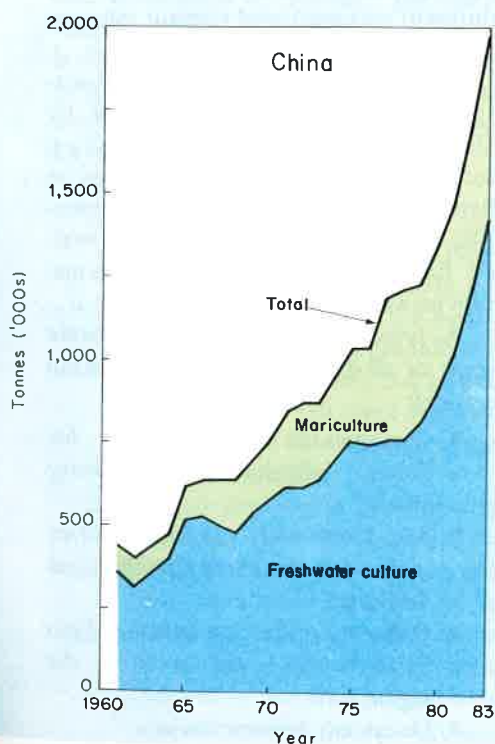


Fig. 1b. Chinese freshwater culture and mariculture growth, 1960-1983.

been registered in Malaysia (16.3%) and the Philippines (14.8%), aquaculture production in the Philippines was 1.6, 2.5 and 6.6 times that of Indonesia, Thailand and Malaysia, respectively. Aquaculture from Singapore since 1971 has been fluctuating between 500 and 917 t but increased to over 2,014 t in 1983 largely due to increased production of green mussels, groupers and seabass.

Many of the South Asian nations have no traditional aquaculture practices but most have recently developed ambitious aquaculture development programs to increase fish production. Compared to East and Southeast Asian countries, their contributions are relatively low. The total production in these countries including Bangladesh, India, Nepal, Pakistan and Sri Lanka was about 300,000 t in 1983, constituting only 6% of total Asian production. While India and Bangladesh have a long history of fishfarming, total production is still low considering their vast aquatic resource potential.

World Fish Production Through Aquaculture

Based on the new data sources, world aquaculture production has increased at a commendable rate of 10.5% over the last 11 years from 3.273×10^6 t in 1973, 4.281×10^6 t in 1975, 5.333×10^6 t in 1980 and 7.050×10^6 t in 1983. Production has doubled over a decade. There are sufficient signs of accelerated production in recent years to indicate that the prospect of doubling aquaculture production every 10 years for the next three decades may not be an impossible dream.

¹Yen-Wu et al., editors. 1984. Fishery economics of China (1949-1983). Agriculture Economics Institute of Political Science Academy of China, Ministry of Agriculture, Animal Husbandry and Fisheries and Fishery Economics Society of China. 1,767 p. (In Chinese).

²Report of the working group on fisheries for formulation of Seventh 5-year plan (1985-1990) Ministry of Agriculture (1984), Krishi Bahan, New Delhi. 152 p.