



OVERVIEW OF THE FISHERIES SECTOR IN THE SOUTHEAST ASIAN REGION

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Fig 1. Map of Southeast Asian Countries

The seas of Southeast Asia form part of the South China Sea, constituting about 2.5% of the World Ocean. Bordered by Brunei Darussalam, Cambodia, China, Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, Taiwan, Thailand and Vietnam (Fig 1), most of these seas are under the jurisdiction of the archipelagic States of Indonesia and the Philippines.

Though Taiwan is usually considered an East Asian country, it is included in this paper because it is bordering the South China Sea. The paper also includes the Lao PDR and Myanmar. Lao PDR is the only country in the region, which is land-locked, and solely engaged in inland capture fisheries and freshwater aquaculture.

THE ROLE OF FISHERIES IN THE NATIONAL ECONOMIES

The Fishery sector plays an important role in Southeast Asia in supplying protein to the population, generating income and employment, and stimulating economic growth. The estimated annual per capita consumption of fish in 1998 averaged 35.3 kg in Thailand to 50 kg in Malaysia (global average 15.2 kg/capita/year).

Income from the export of fresh, frozen, canned and filleted fishery products has become an important foreign exchange source for many countries in the region. The export value of fish and fishery products from the region totaled US\$ 9,914 million in 1999, with Thailand contributing the biggest share – 41.5% or 1.2 million mt - valued at US\$ 4,110 million.

With a share of 40.5% or US\$ 1,594 million in the total fisheries imports in the region in 1999, Hong Kong ranks first in imports, followed by Thailand with US\$ 840.7 million (21.4%) and Taiwan US\$ 556.7 million (14%).

TOTAL FISHERY PRODUCTION

Rapid development of fishing technologies during the late 1950s and during the 1960s with the introduction of purse seine, gill net and trawl fisheries, as well as the introduction of modern aquaculture practices, had increased the region's contribution to world fishery production from less than 10% in the 1950s to 17% in 1980s and 30% in the 1990s. The annual growth rate of the region's fisheries during the 1980s was 10%, while the global growth rate was about 2% during the same period. In 1999 Southeast Asia produced 19.3 million mt of fish. Indonesia, Thailand and the Philippines were the largest producers. During 1995-99, total fish production increased by 33.4% (4.8 million mt). The total production of Indonesia increased by 78%, while that of Thailand increased by 1.49% in terms of landed quantity. Without Indonesian figures in value, the major producers were Thailand (US\$ 4,996 million), the Philippines (US\$ 2,302.5 million) and Malaysia (US\$ 1,294.3 million).

MARINE CAPTURE FISHERIES

Marine capture fisheries are conducted both by commercial and over four million small-scale fishermen using a wide variety of fishing gear. Marine fish catch in

1999 contributed 75.1% (14.5 million mt) of the total production. Total catches showed an increase of 46.2% (4.58 million mt) during 1995-1999. The major contributors to marine catches are Indonesia (6.38 million mt), Thailand (2.72 million mt) and the Philippines (1.73 million mt). During the same period, the value of marine production increased by US\$ 11.6 million in Thailand (0.65 %) but decreased by US\$ 281.4 million (15.27 %) in the Philippines.

The rapid growth of commercial trawling since the late 1960s and the increasing use of such fishing gear as push nets by small-scale fishermen have resulted in a remarkable decline in demersal fishery resources in areas like the Gulf of Thailand, Manila Bay and the Malacca Straits.

An increasing quantity of trash fish of poor market value (0.33 million mt) was caught in 1999 (4.38% of total marine catch), which had a market value of US\$ 27.6 million (0.71% of total landed value). Changes in species composition and a progressive reduction in size of caught fish are clear indicators of over-fishing.

Pelagic fish; including mackerel (0.57 million mt), sardine (0.61 million mt), scad (0.9 million mt) and anchovies (0.28 million mt); contributed about 30.7% (2.35 million mt) of the total marine catch in 1999. There are signs of stock depletion of many commercially important pelagic species from over-fishing in such areas as the Gulf of Thailand.

Tuna fisheries contributed 13.4% (1.03 million mt) of total marine production in 1999, with a value of US\$ 96.1 million (2.48% of total landed value), caught mainly by Indonesia and the Philippines. The most important species were kawakawa or Eastern Little Tuna (*Euthynnus affinis*, 263,143 mt), skipjack tuna (*Katsuwonus pelamis*, 355,043 mt), frigate and bullet tuna (*Auxis* spp., 254,398 mt), longtail tuna (*Thunnus tonggol*, 61,108 mt) and yellowfin tuna (*Thunnus albacares*, 168 mt).

Shrimp resources in the coastal waters have also been fully exploited. The catch of shrimps amounted to 426,310 mt in 1999 (US\$ 443.2 million or 11.4% of total catch value). 0.21 million mt of cephalopods (squids, cuttlefishes and octopus) was caught in 1999 with a market value of US\$ 189.4 million (4.88% of total value). Although the potential yield of these resources is estimated at 600,000 mt per year in the areas, the resources might already be fully exploited in some areas like the Gulf of Thailand.

Coastal fishery resources of the South China Sea region have been over-fished and depleted to varying degrees. Unless new fishing grounds or new fish stocks like deep sea shrimps, cephalopods and fish are identified, there is hardly any potential for a further expansion of marine capture fisheries.

One of the major problems in managing multi-species, multi-gear tropical fisheries is the lack of sufficient information on the population dynamics and biometrics of these species to estimate their maximum sustainable levels of exploitation.

INLAND CAPTURE FISHERIES

Inland capture fisheries play an insignificant role in the total fish production in Southeast Asia. The fisheries have been under severe stress in recent years because of the deterioration of water quality from sedimentation and pollution from domestic, industrial and agricultural sources, reclamation of breeding habitats including swamps, ecological interference and diversions from dams and other such barriers etc.

In 1999, world inland production totaled 48.8 million mt. Capture fisheries produce 8.5 million mt (17.4%) and inland aquaculture produce the remainder. China, with a production of nearly 2.3 million mt, produces 26.9% of the world total.

Southeast Asian inland fish catch of 1.24 million mt in 1999 contributed 6.5% of the total fishery production in the region. Indonesia, Myanmar, Thailand, Vietnam, and Cambodia are the most important inland capture countries in the region. Indonesia had the highest production of 0.33 million mt, followed by Cambodia (0.23 million mt), Thailand (0.21 million mt) and Vietnam (0.17 million mt)

Expansion of inland fisheries in Cambodia, Myanmar and Thailand led to an increase of total production in the region to 189,728 mt during 1995-1999 while production in Indonesia and the Philippines showed decreasing trends during the same period.

In 1999, the major inland fishery products were miscellaneous fish (792,929 mt), cyprinids including carp, barbel etc. (104,614 mt), molluscs (87,858 mt), cichlids like tilapia (76,383mt), snakehead (68,654 mt), catfishes (31,163 mt), gouramis (49,868 mt) and crustaceans (16,032 mt). Thailand was the top producer of cyprinids and cichlids. Indonesia topped the list in the production of catfish, gourami, snakehead and crustaceans.

Recognized that official production data are generally unreliable. In order to get a more realistic idea of the size of the fishery, the MRC/DOF/Danida Project for the management of the Freshwater Capture Fisheries of Cambodia has set up a catch assessment system based on stratified random sampling of the catch and frame survey information on fishing gears utilized in the large and medium-scale fisheries. In addition, socioeconomic household surveys carried out in 1994-1995 provide catch estimates of the medium-scale and family fisheries. Their data for the annual inland production increase from 75,000 mt up to 300,000-400,000 mt.

AQUACULTURE

Aquaculture has a great potential to increase fish production and income for coastal populations. Constraints in aquaculture development can be overcome by local capacity building and the development of small-scale and decentralized aquaculture systems with small-scale hatcheries, nursing trading networks and on-farm back-yard breeding.

Up to the 1970s, the contribution of aquaculture to fish production in the region was negligible. Aquaculture has increased considerably in importance after several

countries prioritized its development to augment fish food supply and to increase export earnings. Aquaculture development accelerated rapidly in the 1980s at an average growth rate of 28% per year, as compared to about 4% during the 1970s, and the production increased to over 2 million tons in the 1990s.

Between 1995 and 1999 the yield from aquaculture reached 3.55 million mt, valued at US\$ 7,783.9 million. The Philippines was the leading producer with 0.95 million mt, accounting for 26.73% of the total production; followed by Indonesia (0.88 million mt, 24.87%), Thailand (0.69 million mt, 19.48%) and Vietnam (0.48 million mt, 13.54%). In terms of value, Indonesia ranked first with US\$ 2,204 million, accounting for 28.3% of the total value. Total aquaculture production increased by one million mt (38.96%) during the 1995-1999 period with an increase in value of US\$ 3,089 million (65.78%).

The most important products are seaweeds, shellfish (cockles, oysters, mussels etc.), shrimps (mainly tiger prawn, *Penaeus monodon* and the freshwater prawn, *Macrobrachium rosenbergii*), fishes (carp, tilapia, catfish, milkfish, gourami, eels etc.) and crabs.

Coastal Aquaculture

Brackish water aquaculture plays a significant role in food fish production and in generating business investments, foreign exchange, employment and livelihood in most Southeast Asian countries.

A wide range of aquatic products are produced, including penaeid shrimp, milkfish, mussels, oysters, mud crab, and seaweed. In 1999, The Philippines was the largest producer (0.86 million mt), followed by Indonesia (0.51 million mt) and Thailand (0.44 million mt). The most important species were tiger prawn (0.36 million mt), milkfish (0.43 million mt), other fishes including seabass, grouper, bream and mullet (62,348 mt), and blood cockles (141,590 mt).

Freshwater Aquaculture

Cambodia and the Lao PDR produce mainly freshwater fishes and are potential growth areas for freshwater aquaculture. World fish production in terms of quantity and value is much higher in the freshwater environment than the marine and brackishwater environments. In 1999, about 38.3% (1.35 million mt) of aquaculture production in the region came from freshwater culture. Vietnam was the top producer with 0.38 million mt (28% of total freshwater culture production), followed by Indonesia (0.37 million mt), Thailand (0.25 million mt), Taiwan (0.12 million mt) and the Philippines (88,258 mt). The major species cultivated are miscellaneous fish (0.45 million mt), carp and barbel (0.4 million mt), followed by cichlids like the tilapia (0.31 million mt), and catfishes (0.1 million mt).



Fig 2. A plentiful supply of fish from inland resources

Developments in Aquaculture Technologies

Since its establishment in 1973, the Aquaculture Department of the Southeast Asian Fisheries Development Center (SEAFDEC) has played an important role in developing and disseminating aquaculture technologies both inside and outside the region, with particular emphasis on (a) development and improvement of culture techniques; (b) production of genetically improved broodstock; (c) production of adequate supplies of quality seeds; (d) development of cost-effective feeds and dietary supplements; (e) control and prevention of diseases; and (f) development of sea-farming and sea-ranching techniques. Culture techniques of prawns and milkfish have received particular attention because of their economic importance. Major achievements were the development of broodstock and hatchery/nursery techniques for tiger prawns, and the completion of the life-cycle of milkfish in captivity. Advances have also been made in hormone-induced spawning of mangrove red snapper (*Lutjanus argentimaculatus*), spontaneous spawning of grouper (*Epinephelus suillus*), improved spawning and fry production techniques of Asian seabass (*Lates calcarifer*) and fry production of the rabbit-fish.

POST-HARVEST PROCESSING AND INFRASTRUCTURE DEVELOPMENT

With the introduction of efficient, modern fishing gear and techniques in the region since early 1960s, the fishing fleet has also been modernized and expanded. Indonesia has the largest fishing fleet of over 400,000 vessels, followed by Thailand with 54,538 and Malaysia with 32,672 boats and vessels. The number of trawlers in Thailand has increased from about 100 in 1960s to about 13,000 in 1990s, however the fleet has recently shrunk in size.

A large number of Japanese, Taiwanese and Korean long-liners and purse-seiners were also fishing, mainly for tuna in Southeast Asian waters and surrounding seas during the 1970s and 1980s. These fisheries later decreased with the reduction in the fish stocks and eventually stopped with the promulgation of the United Nations Convention on the Law of the Seas, when most of the Southeast Asian waters came within the jurisdiction of the Exclusive Economic Zones (EEZ) of the coastal states.

Fish is generally consumed fresh, but is also salted, dried, fermented, processed into fish balls, fishcakes, and fish sausages, Surimi etc. or into value-added products in frozen, filleted or canned forms. A large number of factories have been established for manufacturing fish sauce and paste, processing and packaging of fish fillets, squid and shrimp, production of fish balls, sausages, Surimi etc., and canning of tuna, sardine, mackerel and milkfish. Even trash fish of poor market value is increasingly commercially. In Thailand and Malaysia alone almost one million mt of trash fish is used every year to produce fishmeal. Modernization and development of harvesting and post-harvesting technologies have been well supported by the construction of fishing harbors, establishment of marketing infrastructures, cold storage and ice plants, development of refrigerated transport, and provision of training and extension work. It has been estimated that in Thailand alone over 7,000 establishments like fish processing factories, provide employment for about 70,000 people, mainly women.

ISSUES OF SUSTAINABLE DEVELOPMENT AND STRATEGIES FOR MANAGEMENT

The fish stocks in the coastal waters of the region are generally depleted for various reasons. Environmental degradation of habitat is caused by the use of harmful fishing gear and methods, and by pollution from domestic, industrial and agricultural sources. Ineffective enforcement of fisheries management systems and regulations further aggravate the situation, which is further complicated by the fact that fishery resources are still widely regarded as a common property with free and open access.

Fisheries management policies need to be shifted from maximizing catches to optimizing the long-term net socio-economic benefits, through the establishment of rights based fisheries systems, effective management of fishing capacity, control and prevention of pollution, resource enhancement programs, and the decentralization of fisheries management. The strengthening of fishery information and statistical databases are essential to support such processes. In this connection, highest priority in fishery research should be assigned to the development of stock assessment methodologies applicable to the multi-gear, multi-species fisheries of Southeast Asia.

Major issues of aquaculture development in the region are (a) prevention of conflicts in land use, and

control of further destruction of mangrove forests for aquaculture expansion; (b) prevention of saltwater seepage into agricultural land; (c) the need to maintain the water quality of the farms and the prevention of pollution in the surrounding waters from farm effluents; and (d) other environmental aspects as reduction in the natural spawning and nursery grounds of coastal organisms and coastal biodiversity of fauna and flora. Technological aspects as (a) the development of standardized techniques for cultivating species like penaeid prawns, groupers, snappers, mudcrabs etc.; (b) development of breeding, hatchery and nursery techniques for their fry; (c) production of high quality feed supply; and (d) control and prevention of epidemics and diseases etc. are also in need of prioritized attention.

Post-harvest losses and wastage of fish caught are high in Southeast Asia, and estimated to be about 25% of the landed volume. Post-harvest technology development has played an important role in reducing this wastage through the introduction of new products and alternate means of utilization. However, there is still a need to improve facilities and infrastructure for fish handling, processing, marketing, distribution, etc.

Several recent global initiatives have wide-ranging implications for the fisheries of Southeast Asia and concerted collective action is needed to adjust the fishery management policies and strategies both at the national and regional levels. Regional cooperation plays a vital role in economizing in the costs of fish production, improving shrimp farm management and development of technologies, harmonization of fishery product quality standards; and collective trade negotiations for developing fishery product exports.

Both the fisherfolk and the public also need to be made aware, through the media and other suitable publicity measures, of the importance of utilizing food resources in a sustainable manner and the role of environmental protection. In this context, the Code of Conduct for Responsible Fisheries should be given widest publicity for this purpose.



Fig 3. Various products from fisheries