



Fish By-Catch . . . Bonus From The Sea

Fish By-Catch
Bonus From The Sea

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Report of a Technical Consultation
on Shrimp By-Catch Utilization held in
Georgetown, Guyana, 27-30 October 1981



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Demersal catch by the shrimp trawling operations of Sabah, Malaysia, totaled 2.7×10^4 t in 1979, comprising 5.4×10^3 t shrimp and 2.1×10^4 t fish. Fourteen groups of fish are considered most important in the by-catch, which consists of more than 100 species. Until very recently, a considerably large portion of the fish by-catch was discarded at sea, 57.4% being discarded in 1979; 26.1% was sold fresh for human consumption, 8.5% was processed into fish balls, cakes, or salted, dried products. The remainder was used in animal feeds (5.9%) and fertilizer (2.1%). Increasing amounts of by-catch are being used as feed for fish and prawns in the newly developed aquaculture projects. The amount of "trash" fish required for these projects is estimated, within 10 years, to be greater than the amount currently landed.

The coast of Sabah state, Malaysia, stretches about 1500 km and houses more than two-thirds the population, including some 15 000 people who derive their living from fishing. In 1979, 4600 motorized fishing boats operated along the coast, and, of these, 800 were shrimp trawlers. Shrimp trawling is the most important fishery in Sabah. It began in 1960 when the otter-trawl fishing method was used successfully in Sabah waters. The shrimp catch since has increased from 930 t in 1963 to 5430 t in 1979 (Chin and Goh 1967; Malaysia, Department of Fisheries 1980).

Although bottom trawling has proved to be the most efficient method for catching shrimp in Sabah, it also unselectively catches great quantities of fish. The fish by-catch, on average, forms more than 80% of the total catch by weight, and its disposal has always posed a difficult problem.

In 1979, total catch by shrimp trawlers was estimated to be about 2.7×10^4 t, the by-catch being 5.7×10^3 t, 12.4×10^3 t, and 3.2×10^3 t in the west coast, northeast coast, and the southeast coast, respectively. The fish/shrimp ratio was highest in the waters off the southeast coast (6 : 1). Thus, the amount of fish caught by shrimp trawlers in that year was 21 250 t.

Although more than 100 species of fish are caught by shrimp trawlers in Sabah waters, there are 14 important groups of commercial fish. These are unprocessed and sold fresh in the fish markets for human consumption, especially to the people living in the remote interior. They comprise threadfin bream (*Nemipterus* spp.), trevally (Carangidae), grouper (*Epinephelus* spp.), croaker (Sciaenidae), grunt (*Pomadasy*s spp.), white fish (*Lactarius lactarius*), red snapper (*Lutjanus* spp.), goatfish (*Upeneus* spp.), mackerel (*Rastrelliger* spp.), small barracuda (*Sphyraena obtusata*), flathead (*Platycephalus* spp.), halibut (*Psettodes erumei*), hairtail (*Trichiurus haumela*), slipmouth (Leiognathidae), and lizard fish (*Saurida* spp.) (Bin Sam Abdul Latiff et al. 1976; Bin Sam Abdul Latiff 1979).

Almost all species in the fish by-catch are edible; however, the blowfish (Lagocephalidae) are considered poisonous. The tripod fish (Triacanthidae), the cardinal fish (Apogonidae), and commercial species that have not attained marketable size (12 cm) are usually not marketed for human consumption.

Owing to the limited storage and ice available on board the vessels, shrimpers discard most of the low-value commercial fish, irrespective of size, in the first 2 days of a voyage, in addition to the nonmarketable fish, and only retain those of high value. However, they try their best to save the entire fish by-catch on the last day of fishing, especially that of the last haul, for marketing. Thus, the "trash" fish that appear at the fish markets are usually small, but those that have been thrown overboard at sea, which constitute the greater portion of the catch, are all sizes.

Sabah has gone through various stages of shrimp-trawling development in the past 20 years. On this 21st year of the establishment of this unique industry, shrimpers can look back with a sense of pride that they have now mastered the techniques of catching shrimp and can look forward to proceeding further afield in future. Unfortunately, the tech-

niques for processing and marketing the fish by-catch have not developed along with the shrimp industry.

Of the total 2.1×10^4 t of fish caught in shrimp trawling in 1979, about 1.2×10^4 t or 57.4% were discarded at sea. The rest were marketed fresh for human consumption (26.1%), made into fish balls, fish cakes or salted, etc., for human consumption (8.5%), marketed fresh for animal feeds (5.9%), or used as fertilizer (2.1%).

Owing to the rapid increase in the urban population, the consumption of fresh, unprocessed fish in the cities has risen steadily in recent years. The same is true in rural towns, and, aided by the improvement of road transportation, the sales of fresh fish have increased many fold.

The marketing of fresh fish in Sabah is carried out mostly by individuals or the so-called fishmongers. Their business activities are centred at markets, which are built by the government. Every city or town has at least one fish market, which is, in the case of coastal towns, always at the waterfront.

Wooden boxes, lined with foam plastic or styrofoam for insulation, are extensively used by fishmongers to keep fresh fish. When the day's supply is greater than the demand, the excess fish are stored in crushed ice in the insulated boxes in the markets. The boxes are also used for delivery of fresh fish to the rural centres, 100–250 km away. The holding capacity of these boxes ranges from 120 kg to 300 kg. In most cases, light trucks are used for transport, each truck carrying 1–3 boxes. The driver is often the owner of the cargo. This fresh-fish marketing network has so far been serving the rural communities quite satisfactorily, and indications are that it will expand whenever there are new marketing outlets. Prices of fresh fish vary, depending on the supply and demand and the grade of fish. In 1979, top grade fish sold for U.S.\$1.37–2.48/kg, and "trash" fish, U.S.\$0.06–0.20/kg. The two intermediate grades of fish ranged from \$0.34/kg to \$1.62/kg.

Fish balls and fish cakes from the by-catch primarily incorporate conger eel (*Muraenesox cinereus*), lizard fish, hairtail, threadfin bream, shad and herring (*Ilisha elongata* and *Opisthopterus tardoore*), croaker, and sharks.

The flesh is extracted either by hand or by mechanical separator. Normally, the species are mixed together, and other fish, such as

yellowtail (*Caesio* spp.) and Spanish mackerel (*Scamberomorus* spp.), which are not normally caught by the shrimp trawlers, are often added for improved quality. Each manufacturer has a secret blend.

Recent processing trials on fish balls, conducted by the Department of Fisheries, indicated that two species of fish in the by-catch, *Leiognathus splendens* and *Pomadasyss hasta*, which had not been used by commercial processors, could produce fish balls of moderate quality. Catfish (Ariidae) were also tested but were found to be unacceptable (Snell 1978a,b); when salted and dried, however, they sell well in local markets. They are split, lightly salted in brine, and sun dried. This process has proved appropriate for croakers as well.

More "trash" fish are used for animal feeds now than were used 2 years ago because of the development of intensive culture of prawns (or shrimp) in brackish-water ponds and marine fish (grouper, snapper, and sea perch) in floating net-cages. These two newly developed systems of aquaculture are heavily dependent on "trash" fish as feeds. A floating net-cage farm holding 60 000 fish is estimated to consume 200 t of "trash" fish annually. A 60-ha prawn-culture farm in Tawau at present consumes 1.5 t of "trash" fish each day, and, when the farm has completed its development target of 800 ha of ponds, its daily need will be 20 t or 7.3×10^3 t/year, which is more than double the total fish by-catch for Tawau in 1979.

Several large-scale commercial prawn-culture projects are now being implemented in Sabah. When these projects are completed and operational, the amount of "trash" fish required by the projects will probably exceed the amount available, consuming the entire fish by-catch from shrimp trawling. Thus, the entire yearly fish by-catch may be utilized within the decade.

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