

The Filter Net (Tangab) Fishery in Iloilo Strait, Philippines: Food and Livelihood for Coastal Communities in the Midst of Waste of Non-target Fishery Resources

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The Philippines is home to a mixed of blessings: an enormous marine biodiversity, a tremendous variety of fishery enterprises, and about 50 million coastal residents who mostly fish and eat fish. So many animals and so many nets in the water result in huge total catches of target fishery species, but also unfortunately of ‘trash fish’ — huge numbers of diverse marine larvae, juveniles, small adults, and unwanted species.

‘Trash fish’ is a category of fisheries by-catch, which as a whole has been estimated to average about 20% worldwide, but difficult to quantify in Philippine fisheries given the large number and variety of fishers, fishing grounds, gears, species, and markets. Moreover, it is difficult to quantify the costs and benefits of a given fishery, and in particular to balance the economic benefits to the coastal communities in terms of food and livelihood versus the ecological costs of catching (killing!) untold numbers of larvae, juveniles, and small adults of innumerable species. Qualitative information is readily available, however, and this article takes as example the case of the filter net or tangab fishery in Iloilo Strait in central Philippines. A typical *tangab* catch from Iloilo strait is a large mixture of small sizes of low-value and non-marketable species loaded from bagnets into many wooden boxes.

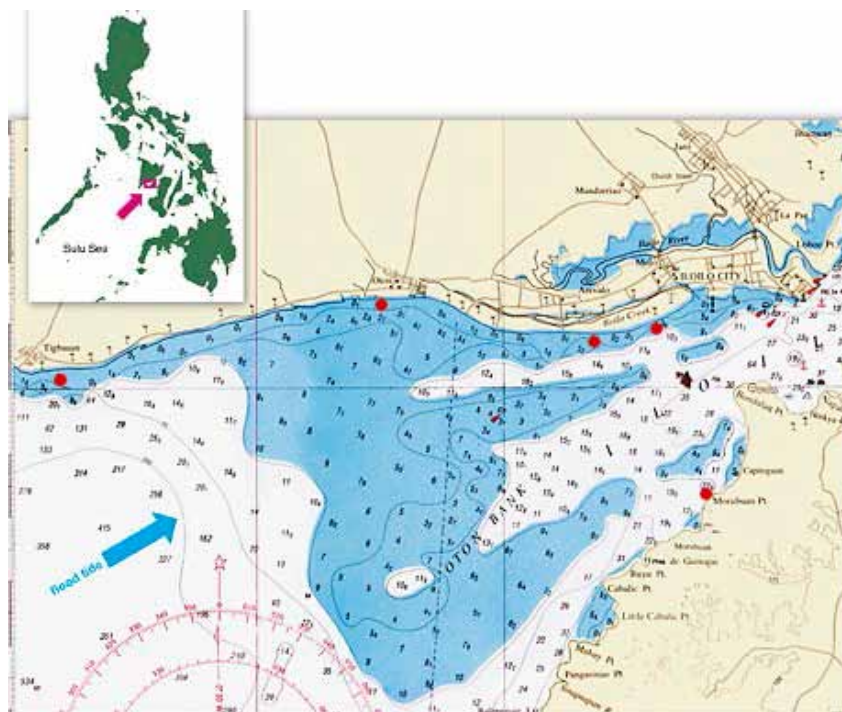


Fig. 1. Iloilo Strait between Panay Island and Guimaras Island in central Philippines, showing the tangab fishery sites (● in Morobuan in Guimaras, Arevalo and Calumpang in Iloilo City, Oton Bank, and Atabayán in Tigbauan

Tangab fishery sites

Between the southeastern coast of Panay Island and the northeastern coast of Guimaras Island in central Philippines is Iloilo Strait (Fig. 1), a very narrow channel mostly less than 20 m deep. Iloilo Strait is a unique location for a filter net fishery because the water from the Panay Gulf and the Sulu Sea floods in and out of the channel twice a

Table 1. *Tangab* fishery sites in Iloilo Strait, some aspects of operation, and estimates of volume of good-value fish versus low-value ‘trash fish’ in 2007

<i>Tangab</i> fishery sites	Number <i>tangab</i> nets	Number owners/operators	Distance offshore (km)	Water depth (m)	Season of operation	‘Good fish’ (% vol.)	‘Trash fish’ (% vol.)
Morobuan, Guimaras	88	30	<1	15-18	Jan -Dec	50	50
Calumpang, Iloilo City	15	4	<1	10-18	Jan - Dec	5	95
Arevalo, Iloilo City	19	8	1	12-17	Sep - Jun	5	95
Oton Bank and Atabayán*, Tigbauan	280	28	3-4	12-20	Nov - May	3	97*

* For Atabayán, the small sergestid and euphausiid shrimps are not ‘trash fish’ but are actually the target species, intended for the ginamos and tinabal factories right at the beach



Fig. 2. Tangab location, structure, and operation

day and generates strong currents that bring all kinds and sizes of marine animals into the tangab nets that are set in the shallow parts of the strait. *Tangab* operations are concentrated at four fishing villages fronting Iloilo Strait: Barangay Morobuan in Jordan, Guimaras; Barangay Calumpang and Barangay Santo Nino Sur, Arevalo, in Iloilo City; and Barangay Atabayan in Tigbauan, Iloilo, the landing site for *tangab* operations in the Oton Bank, offshore from adjacent Oton town (Fig. 1, Table 1). Rather belatedly it was learned that another fishing village east of Iloilo River and further inside Iloilo Strait, also has some *tangab* in operation.

Tangab structure and operation

Tangab are large fixed filter nets set in waters 10-20 m deep and 1-4 km offshore (Fig. 2). The nets are held open by coconut trunks driven into the sea bed. The opening is usually 10 m wide and 10 m deep. The net is 20-30 m long to the cod end, with large mesh at the mouth (10 cm), smaller meshes at the middle (5 cm), and fine mesh at the cod end (3 mm, then 1 mm). *Tangab* nets are set up in groups of 2-12 per owner depending on capital (Table 1). Fishing with *tangab* is done only during calm seas, weak winds, and no storms. *Tangab* are passive gear which filters nearly everything from the water surface to the sea bed. The nets are dropped only during periods of strong water currents, that is, 7-9 days around the full moon and 7-9 days around the new moon. During an operation, the fishermen work from dusk till dawn, dropping the *tangab* net in time for the flood tide into Iloilo Strait, a few hours before the night high tide. At high tide, the fishermen haul the nets up to harvest the catch. Before the tidal current reverses direction, fishermen may reverse the nets to catch fish during the ebb tide. The catch is sorted, brought to shore, washed, picked, and sold.

Tangab as source of livelihood and food

In 2007, there were about 70 *tangab* owners operating about 400 *tangab* nets at the four sites in Iloilo Strait (Table 1). A *tangab* owner employs a boat crew of 3-5

men depending on the boat size and the number of nets operated. In addition to the boat crew, large numbers of men 15-40 years old clean and transport the catch, and large numbers of women (mostly mothers) help in the post-harvest processing and fish vending (Fig. 3). The wages of the fishers and the income from the catch are not much, but there is always free fish for the day and the goodwill of the *tangab* owner and the fishing team.

Even more than the coastal villagers employed in the *tangab* fishery are the people (both near and far) who find “sud-an” or “dapli” (protein dish) in the *tangab* catch. On nights and early mornings when the *tangab* are harvested, the locals gather at the beach to buy some of the good fish or pick the fresh ‘trash fish’ for edible species and sizes, often enough free fish for the day’s breakfast and lunch (Fig. 3). Many villagers also dry (under the sun) some of the ‘trash fishes’ for later consumption.

Tangab catch: more ‘trash fish’ than good fish

Tangab nets filter huge volumes of water and catch everything carried by the currents— marine animals (no plants) from the sea surface to the sea bed. Numerous species of fishes, crustaceans, mollusks, and other invertebrates



Fig. 3. The tangab fishery provides livelihood and food to many coastal residents



Fig. 4. Good fish and 'trash fish' from the tangab in Morobuan, Guimaras

are caught in the *tangab* at the four sites (Figures 4, 5, 6, 7) and at times even large endangered marine animals such as whale sharks and dugongs. A relatively small amount of the tangab catch is good fish—relatively high-value fishes, shrimps, mantis shrimps, crabs, squids, and cuttlefishes sold at Philippine Pesos 50-300/kg according to species. Some days the tangab would catch large schools of the larval anchovy, *Stolephorus* spp. (locally known as “lolo-lobo”) or the sergestid shrimp, *Acetes* spp. (locally called “hipon”) that have high market value (Philippine Pesos (P) 80/kg or P1,000-1,200 per box). A much larger proportion of the catch is ‘trash fish’ of very low market value (usually P1-5/kg). Because of the small mesh (1-3 mm) at the cod end, tangab nets catch enormous numbers of small individuals that make up most of the ‘trash fish’—larvae, juveniles or small adults of various fishes and invertebrates. After being picked while fresh for edible species and sizes, the remaining ‘trash fish’ are sun-dried and sorted for human consumption, for fish meal, and livestock feed. Catches from the four tangab fishery sites vary in the proportion of good fish to ‘trash fish’ (Table 1). The *tangab* in Morobuan catch large amounts of good fish that are marketed in Guimaras and Iloilo City, but about an equal amount is ‘trash fish’ (Fig. 4).

The *tangab* in Arevalo and Calumpang catch some good fish (about 5%) that are sold in the neighborhood, but much greater amounts of ‘trash fish’ (95%) (Figs. 5, 6). In Arevalo, much of the low-grade ‘trash fish’ is sold to a

pond operator who raises sea bass and groupers for local restaurants. It is quite distressing to be present when the tangab catch is landed. Dead animals are left on the beach and in the water—enormous numbers of pufferfishes, eel leptocephali, lobster phyllosomas, megalopas, small crabs, polychaetes, and the juveniles of many fish species that are commercially exploited at older stages and larger sizes.

Many people think that the small animals caught by *tangab* are worthless and that it is no big deal to waste them. But in fact, these small animals, if not caught, will grow big to be harvested later by the fishery or become the breeders to perpetuate the species or serve as prey for fishery species, and otherwise sustain the food webs that underpin coastal ecosystems. Thus the wanton waste of small animals is not acceptable and must be prevented or markedly reduced.

The numerous tangab nets set in the Oton Bank target the small but abundant sergestid and euphasiid shrimps (*Acetes* spp. and other species) but also catch large amounts of larval and juvenile fishes. About 250 boxes of these small shrimps and fishes are landed after a night’s operation (Fig. 7). Although small and otherwise of low per unit value, these targeted species are not ‘trash fish’,



Fig. 5. Good fish and 'trash fish' from the tangab in Arevalo, Iloilo City



Fig. 6. Good fish and 'trash fish' from the tangab in Calumpang, Iloilo City



Fig. 7. The tiny shrimps (left) and small fishes (right) targeted by the *tangab* in Oton Bank and landed in Atabayan, Tigbauan are processed into either dried shrimps *kalkag*, shrimp paste *ginamos* or salted fermented fish *tinabal* in cans

but they make up about 97% of the catch volume. Only small amounts of good fish (3%) are caught and sold to vendors at the beach. Most of the catch is landed at three brokers in Atabayan, Tigbauan. Pure fresh *Acetes* spp. is sun-dried into “*kalkag*” for both local and export markets. The small shrimps are made into a salted and fermented shrimp paste locally called “*ginamos*” which is used as condiment in Filipino cooking. Equally large volumes of mixed shrimps and larval fishes are salted in large brining tanks into “*tinabal*,” a drippy fermented fish product that is later marketed all over Mindanao and other islands.

How bad is the *tangab*?

It is often said that there is no ‘trash fish’ in the Philippines, presumably because fishing villages use ‘trash fish’ very well—cook them fresh, dry them, salt them, use them as bait for larger fish, feed them to livestock, feed them to farmed fish. But in fact, there is plenty of ‘trash fish’ in the Philippines, and their post-harvest use does not justify the harvest and waste of small animals with very low market value but very high biodiversity and ecological value. Unnecessary harvest of ‘trash fish’ by any fishing gear leads to: loss of a large variety of species and enormous numbers of individuals, disruption of food webs and community structures of marine organisms, and eventual decline of marine fisheries. The *tangab* fishery has operated for decades, at least since after World War II. Although *tangab* operators complain that the catch has decreased but they continue to operate. The decrease in catch may be due to increase in capacity, but it could also be due to an actual decline in fishery resources but no such data is available. The species caught by the *tangab* in Iloilo Strait, including the larvae, presumably come mostly from the Panay Gulf, an extension of the Sulu Sea— a huge pool and source of fish. A decline in *tangab* catch in Iloilo Strait will not become obvious so readily.



Box 1. Recommendations advanced by Dr. Pagarinao to reduce amount of small animals caught by *tangab*

1. Use larger mesh for the cod end of the *tangab* net, for example 10-20 mm rather than the present 1-3 mm
2. Keep the mouth of the *tangab* net above the sea bed (about 1 meter) to reduce the entry of small benthic animals, and under the water surface (about 1 meter) to reduce the entry of planktonic larvae
3. In collaboration with the *tangab* operators, test the above gear modifications for efficacy in reducing the catch of small animals and ‘trash fish’

The saving grace of the *tangab* fishery is that it has naturally imposed breaks in fishing activity. The *tangab* fishery in the Oton Bank and in Arevalo has a natural closed season for 4-6 months during the “habagat” period (June-September) depending on how soon the monsoon winds start and end and how soon the *tangab* can be brought to working order again. The *tangab* fishery in Morobuan and Calumpang, further inside the strait and somewhat more sheltered from the monsoon, operates more or less year-round except during storms. During the months of operation, the *tangab*

nets fish for only 7-9 days every other week during the full moon and new moon periods. During these fishing days, the *tangab* nets are in the water for only 6-12 hours, usually between dusk and dawn. Thus, the *tangab* nets are not in the water all the time, which is good, but when they are, they fish indiscriminately, which is bad. The amount of small animals caught by the *tangab* must be reduced markedly.

How can the harvest and waste of ‘trash fish’ by *tangab* be prevented?

Regulation of the *tangab* fishery should be made in the ecological and socioeconomic context, and with the participation and acceptance of the direct stakeholders, especially the poor fishers and fish consumers. A workshop was held on 18-19 August 2008 at the SEAFDEC Aquaculture Department in Tigbauan, Iloilo, Philippines to discuss the *tangab* fishery and what might be done to prevent waste of resources and to ensure the sustainability of the fishery and its benefits to the village people. In

Box 2. Unified positions regarding *tangab* fishery

Iloilo City Group

- Iloilo has not licensed the operation of *tangab*, and thus they are illegal

Barangay Calumpang, Molo, Iloilo City

- Only 3-5 operators are now engaged in *tangab* fishery in Calumpang, and if *tangab* is banned, Iloilo City should provide alternative livelihood to the 3-5 operators

Barangay Sto Nino Sur, Arevalo, Iloilo City

- If *tangab* is banned, Iloilo City should provide alternative fishing gear like gill nets to Sto Nino Sur
- *Tangab* operation will be adjusted (longer ropes will be used) so that the opening of the *tangab* net stays below the water surface and above the sea bed and only the animals in the middle of the water column are caught

Barangay Morobuan, Jordan, Guimaras Group

- Limit the issuance of *tangab* permits, and promote the use of large mesh net at the cod end
- Declare a closed season or ‘sem break’ in March-April, when less cash is needed for school while head of the family should be given ‘cash for work’ during off season
- Conduct ‘pulong-pulong sa barangay’ with Local Government Executives and BFAR Region 6

Municipality of Tigbauan and Barangay Atabayan, Tigbauan Group

- Fishing by *tangab* or ‘saludan’ in Tigbauan is acceptable due to the following reasons:
 - The catch of saludan in Tigbauan is mostly hipon, with 10% incidental fish for family consumption.
 - The major livelihood of about 500 families in Barangay Atabayan and adjacent coastal barangays is the catching, processing, and vending of the small shrimps hipon.
 - *Tangab* operation is seasonal, from November to May, and only during the full moon and new moon periods when the tides are high and the currents strong.
 - The fishing permits and concession fees are major sources of tax revenue for the municipality and barangays.

Municipality of Oton Group

- Since the data on *tangab* catch in Oton-Tigbauan boundary show high volumes of the target catch (hipon), we believe that the *tangab* operation in Oton-Tigbauan is not as destructive as the Morobuan and Calumpang *tangab*.
- Oton LGU supports the total ban of *tangab*, but with adjustment period and alternative livelihood programs for affected fisherfolk.
- Years ago, Oton LGU sought to protect and conserve fish resources by banning *tangab* operation in the municipal waters of Oton. However, neighboring towns did not support the ban
- In 2003, Oton lifted the ban on the *tangab*. The LGU now has ongoing study on appropriate number of *tangab* units to be given permits.
- There should be a defined closed and open season for *tangab* in Morobuan-Calumpang areas, as there is for Arevalo and Atabayan.
- During the closed season, operators will look for alternative livelihood and the fishery species gain time to reproduce and grow.

attendance were 20 *tangab* operators and fish vendors, three barangay captains, representatives of the city and town mayors, fisheries managers of the local government units (LGU), and officers of the Bureau of Fisheries and Aquatic Resources (BFAR). Results of this study were presented during the workshop, where three recommendations (**Box 1**) to reduce the amount of small animals caught by the *tangab* were also advanced.

The participants then met by LGU groups and discussed and unified their positions regarding the *tangab* fishery

(**Box 2**). The plenary discussions identified three management issues related to the *tangab* fishery, namely: too much wasted by-catch or ‘trash fish’; too many *tangab* nets in operation; and encroachment of motorized filter nets (sungkit) into areas with *tangab* and other gears (gill nets, etc.) in operation. Several interventions were then recommended (**Box 3**) and the fisheries regulators of the local government units were urged to turn them into policy statements, ordinances, and specific regulations as soon as possible.

Box 3. Interventions recommended during the workshop where fisheries regulators of the local government units were asked to turn them into policy statements, ordinances, and specific regulations

1. Use larger mesh (10-20 mm instead of 1-3 mm) at the cod end (puyuhan) of the *tangab* net
2. Adjust the length of the ropes around the *tangab* opening such that the net mouth stays at least 1 meter off the sea bed and at least 1 meter below the water surface (instead of spanning the entire water column)
3. If the *tangab* fishery targets the hipon or *Acetes* shrimps and other small adult shrimps, then allow operation of the *tangab* only when the hipon is in season (November to April); no hipon, no *tangab*
4. Define the coastal zone for *tangab* operation and allow *tangab* only in designated area
5. Limit issuance of *tangab* permits
6. Increase the mesh size of the non-return valve
7. Implement a unified *tangab* management scheme in adjacent municipalities
8. Conduct study on the appropriate mesh sizes for *tangab* nets
9. Identify alternative and better gear for use by *tangab* operators
10. If *tangab* is banned, provide alternative livelihood to displaced fishers
11. Conduct information education and communication campaign in *tangab* fishery sites (*pulong-pulong*)

About the Author

Dr. Teodora U. Bagarinao is a Scientist of SEAFDEC Aquaculture Department (AQD) based in Tigbauan, Iloilo, Philippines. Her interest in the *tangab* fishery began one day in 2003 while she was looking for shells along Villa Beach just a few kilometers from her house in Iloilo City. On that day she saw people congregating on the beach and learned that a whale shark *Rhincodon typus* had been caught in a *tangab* net. The whale shark was towed to shore but could not be landed because the tide had gone out, and also because it was illegal to do so (the shark was reportedly taken offshore and killed there). Then came several outrigger boats unloading bagnets of small fish into many wooden boxes, which was the typical *tangab* catch, a large mixture of small sizes of low-value and non-marketable species. Thus began her conversations with fishers about the *tangab* and sampling of the species thereby caught. Every summer, she brings students to see the *tangab* catch and to learn to identify them. In 2007, at the behest of the AQD Chief, she conducted a formal study of the *tangab* fishery and after one season had gathered plenty of information about one of the critical issues in marine capture fisheries: food and livelihood for coastal residents in the midst of overharvest and waste of young and small fishes and crustaceans.