

Fishing Methods and Gears in Panay Island, Philippines*¹

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Abstract

The authors surveyed the fishing methods and gears in Panay and smaller neighboring islands in the Philippines in September-December 1979 and in March-May 1980. This paper is a report on the fishing methods and gears used in these islands, with special focus on the traditional and primitive ones.

The term "fishing" is commonly used to mean the capture of many aquatic animals — fishes, crustaceans, mollusks, coelenterates, echinoderms, sponges, and even birds and mammals. Moreover, the harvesting of algae underwater or from the intertidal zone is often an important job for the fishermen. Fishing method is the manner by which the aquatic organisms are captured or collected; fishing gear is the implement developed for the purpose. Oftentimes, the gear alone is not sufficient and auxiliary instruments have to be used to realize a method. A fishing method can be applied by means of various gears, just as a fishing gear can sometimes be used in the application of several methods.

Commonly, only commercial fishing is covered in fisheries reports. Although traditional and primitive fishing is done on a small scale, it is still very important from the viewpoint of supply of animal protein. The primitive fishing methods had been treated mainly by anthropologists from the viewpoint of the roots and the propagation of culture*⁴. It must be realized, however, that the operation of the primitive fishing methods gives us very interesting and valuable insight on fish behavior because the simple methods require a higher level of understanding of the animal and its habits.

The authors had the chance to survey the fishing methods and gears in Panay

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*⁴ The history of the Philippines and Japan shows close relationship in fisheries. There are several hypotheses regarding the root of the ancient Okinawan. One is that the root is, though there is no direct proof, in the Philippines (OHTA, 1896). Many Japanese fishermen from Okinawa Prefecture had immigrated to the Philippines. The history of overseas fishing by Okinawans can be traced back to the establishment of the Itoman Deep Sea Fishing Company in 1905. The following year, two sailing ships, the Daiichi Itoman Maru and the Daini Itoman Maru, set out for the Philippines (UEDA, 1975). Okinawa's unique drive in net fishing which is far more effective in coral areas than modern mechanized fishing methods (SAITO, 1942; UEDA, 1975) can still be seen in the Philippines.

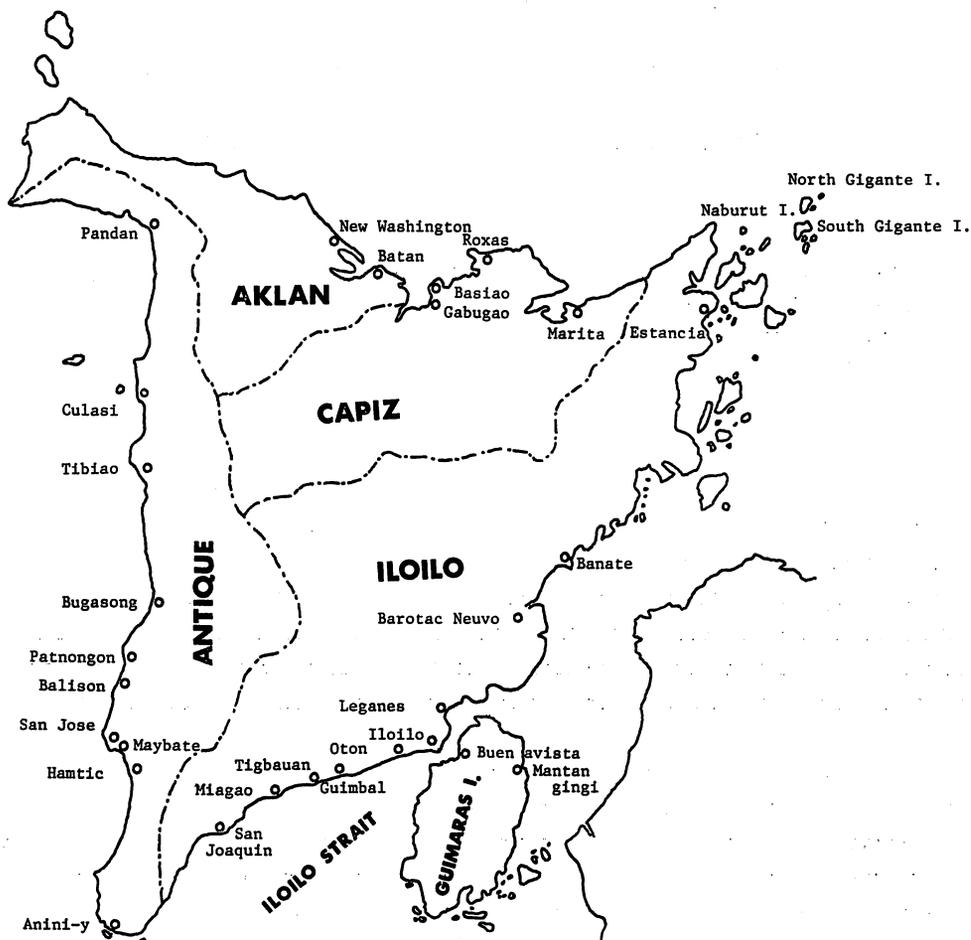


Fig. 1. The area covered by the survey, with key locations shown.

Island and smaller neighboring islands (Fig. 1) in September–December 1979 and in March–May 1980. This paper is a report on the fishing methods and gears used in these islands, with special focus on the traditional and primitive ones. For convenience of presentation, the fishing methods and gears are arranged under a classification system adopted by BRANDT (1972), who proposed that gear classification be based on the principle of how the fishes are caught (BRANDT, 1959). The local names of the various gears and of some aquatic products are given in *italic capitals*; these are the vernacular terms used in Iloilo, Antique, Aklan and Capiz provinces.

I. Without gear

Before any fishing gear was invented, man used his hands to capture or collect fish and other useful organisms from along the shores of lakes, rivers and seas. Fishing

without gear is the very beginning of man's fishing activities; from it, all other fishing techniques have developed. Even in developed countries, collection by hand has considerable economic significance at present.

I-A. Collection by hands and feet

Some fishes and mollusks bury themselves in the bottom substrate of shallow waters, as in ricefields and harvested fishponds. The soft ground is groped with the hands and feet (Fig. 20) to find gobies, telescopic creepers, etc. In this method, only a basket or bag is needed to contain and transport the collected materials.

I-B. Collection with small improvised tools

Small tools such as a farm knife (*ITAK*, *BINANGON*) or a pick (*HONSOL*) are used to kill fish in a tide pool or to remove oysters from rocks (Figs. 21 and 22). A rake (*KAHIG*) (Figs. 2 and 23) is used to unearth hard clams (*PUNAW*) from the sand; the shells are then picked up by hand. A modified scythe with saw-like blade (*GARAB*) (Fig. 3) is used to unearth sand eels (*KASILIL*), which are a delicacy in Panay.

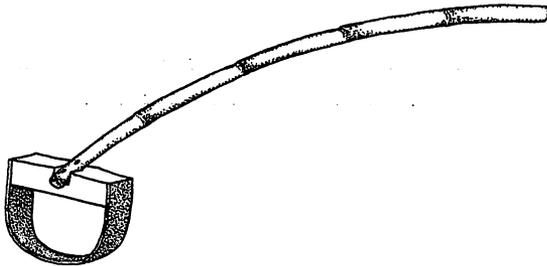


Fig. 2. The rake (*KAHIG*) used to unearth hard clams from the sand (Banate, Iloilo).

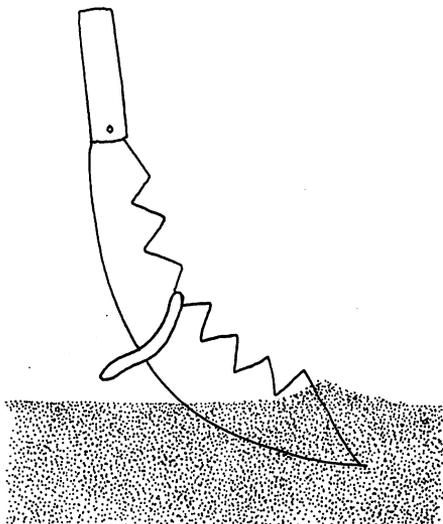


Fig. 3. The *GARAB* used to unearth sand eels (Barotac Neuvo, Iloilo).

I-C. Diving

The gathering activity of fishermen who work without gear is not restricted to the beach or to shallow waters. In warm-water areas, diving is a common method for the collection of materials, such as shells, from the deep. Many economically important shells are collected by divers in the Philippines. In Panay Island, the window pane shell (*LAMPIRONG*), *Placuna placenta* (LINN.) is a major marine product and is the basis of a shellcraft industry that provides income to many. This shell occurs seasonally in different places; thus, the collection ground was Capiz in 1976; Tigbauan in 1977, Capiz in 1978, Oton in 1979 and Mantangingi, Guimaras in 1980. Divers from Sagay, Negros and Bantayan, Cebu come to Panay every year to collect the shell from its muddy bottom habitat. The 1980 collection in Guimaras started in January and lasted until mid-April. The divers can stay at a depth of 10–15 m for one hour by hookah system. The shells are collected by hand and put in a nylon net bag (*SIBUT*) which is hauled up (Figs. 24–27).

In Bantigui, Sicogon and Cañas islands off northeastern Panay, divers make a living from the gold-lip pearl oyster (*TIPAY*), *Pinctada maxima* (JAMESON) which yields very beautiful and much sought-after shells in addition to pearls. They dive in 25–30 m deep waters, employing the hookah system.

II. Wounding gears

In clear shallow coastal waters, particularly coral areas around Panay, spear-fishing is an important activity for subsistence fishermen. At night, with the aid of a kerosene lamp perched from a small boat, fishermen dive and catch sluggish coral reef fishes and nocturnal species like lobsters, with spears and harpoons (*PANA*) (Fig. 4). For fishes lodged in crevices or under big rocks and for hard-to-prise shells, hooks (*KAM-ANG*) (Fig. 4) are sometimes used. A basket container (Fig. 28) is used for the catch when the fishermen operate without boat. Spear fishermen usually wear wooden-framed diving glasses and almost nothing else.

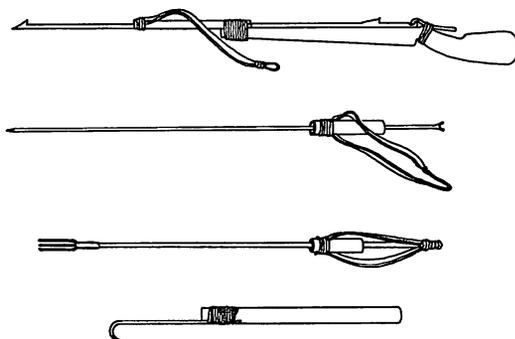


Fig. 4. Harpoons and spears (*PANA*) and hook (*KAM-ANG*) (Pandan, Antique).

III. Stupefying devices

The manner of capture is to prevent escape by stupefying or stunning the fish.

III-A. Explosives

Mechanical narcosis of great extent is produced by use of explosives. Fishing with dynamite is known all over the world and is usually prohibited. This prohibition is based on the fact that young fish and fish fry are also destroyed by the blast. Dynamite fishing is prohibited in the Philippines, but there still are occasional operations in several places, as in the waters off Estancia and Culasi. The home-made dynamite (*PANIRO*, Fig. 29) is made by mixing dried soda with ammonium nitrate at a ratio of 1:2.5 (if the latter is not available, refined sugar is used). The mixture is then saturated with gasoline, dried under the sun (Fig. 30), and crammed into a half or one-gallon glass bottle. A fuse is inserted into the mouth of the bottle which is sealed with clay or paraffin. The fuse is covered with aluminum paper to protect it from strong sunlight. A stone sinker is attached to the bottle. In the selected fishing area, the fuse is ignited as soon as a fish aggregation or school is sighted. The dynamite has to be thrown immediately or else a maiming accident occurs. After the explosion, the fisherman scoops floating fishes and dives for those that sank.

III-B. Ichthyotoxic plants

Poisoning fish with ichthyotoxic plants has been a prevalent practice in tropical areas (WATT and BRANDWIJK, 1962). BRANDT (1972) mentioned ichthyotoxic plants as a method of poisoning fish in many areas in the world. The poisonous plants are cut to pieces, crushed or pulverized and sprinkled on stagnant or slowly running water, or added to bait. The fishes are thereby narcotized or at least so affected that they rise to the water's surface and can be captured easily.

Use of ichthyotoxic plants in fishing is prohibited in the Philippines. Some fishermen in Panay, however, admit that they occasionally use fish poisons in rivers, lagoons and in the open sea (near fish shelters). They know well that the following plants are ichthyotoxic (Fig. 5).

<i>TUBLI</i>	<i>Derris elliptica</i>	roots
<i>LAGTANG</i>	<i>Anamirta cocculus</i>	fruits
<i>KASLA TUBA, TUBLI</i>	<i>Croton tiglium</i>	nuts, roots, leaves
<i>TIG-AO</i>	<i>Callicarpa cana</i>	leaves
<i>PUTAT</i>	<i>Barringtonia racemosa</i>	bark
<i>TANGAN-TANGAN</i>	<i>Ricinus communis</i>	seeds
<i>TABAKO</i>	<i>Nicotiana tabacum</i>	entire plant

Mollasses, the thick, viscid, dark brown syrup that is separated from sugar cane (*Saccharum officinarum*) can also be used as fish poison, a fact that is ordinarily manifested as a form of pollution in rivers adjoining sugar refineries.

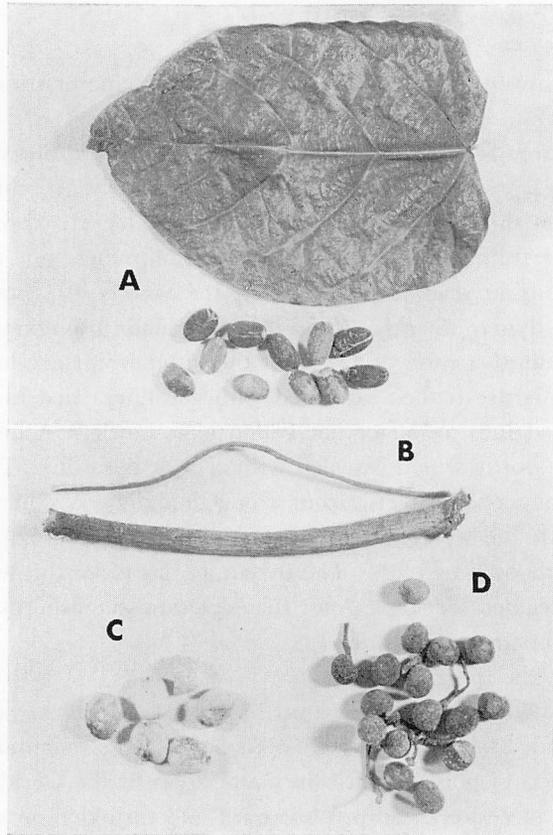


Fig. 5. Ichthyotoxic plants: A, *KASLA TUBA* (*Croton tiglium*); B, *TUBLI* (*Derris elliptica*); C, *TANGAN-TANGAN* (*Ricinus communis*); D, *LAGTANG* (*Anamirta cocculus*) (Panay Island).

Derris root has been used from time immemorial as a native fish poison, and quite recently, as a source of rotenone and related insecticidal substances (WATT and BRANDWIJK, 1962). Fish are extremely sensitive to derris poison so that a very small amount is enough to stupefy them; the amount is far too small to affect their edible quality (HOLTUM, 1969). *D. elliptica* is found, often abundant, in thickets along streams in secondary forests at low and medium altitudes, from Chittagong through Malaya to New Guinea and the Bismarck Archipelago (MERILL, 1967). Derris is well known among Japanese culturists; pulverized derris root is sprinkled on pond water to exterminate the predators of kuruma prawn larvae before the seed are introduced (TACHIBANA, 1971).

REGALADO and FRANCE (1973) wrote in their book, *The history of Panay*, that the most common fish-catching method among the Negritos*⁵ was to use poisonous

*⁵ The Negritos found their way to the Philippine islands about 25,000 to 30,000 years ago. They

roots and leaves of plants. Before fishing, the people first decided on a place to fish. Then they invoked the good spirits with shouts and whistles. If the spirits answered favorably, they started to fish. They used the roots of the *TUBLI* (*Croton tiglium*) when fishing small rivulets. They squeezed the roots, and the extracted juice was stirred into the water. The juice made the fish dizzy and easy to catch. Another method of fishing was to use the nuts of a plant called *LAKTANG* or *LAGTANG* (*Anamirta cocculus*). These nuts were roasted in earthen pots, pulverized and mixed with small shrimps. The mixture was thrown into parts of the sea where there were schools of fish. This killed the fish which were then easily gathered with bare hands. Another poisonous plant used to stun fish was *TIGAO* of which plenty were gathered, placed in a hole dug in hard soil, mixed with lime and the roots of a plants called *LAMPUYANG* together with small-sized pepper locally known as *KATUMBAL*, and pounded to a pulp before it was thrown into the water.

IV. Lines

The method of capture (angling) is to offer the fish a bait in such a manner that it is difficult for the fish to let go once it bites, or to pierce the fish body once it comes within range. Attached to lines are hooks which may be single or multiple, big or small, depending on the desired species.

IV-A. Handline (*BINGWIT*, *PANUNTON*, *BUNIT*)

This is one of the most common gears in the Philippines and very popular in Panay Island. It is generally on a small scale, usually on board a small to moderate-sized boat (*BANGKA*) (Figs. 31 and 32). Sometimes, weighted handlines are operated from the beach. In certain areas, however, big pumpboats go deep-sea fishing using handlines to catch tuna (*BANTALAN*), Spanish mackerel (*TANGIGUE*) and similar large fishes. Fishes associating with moored bamboo-raft fish shelters (see V. Traps) are angled by handline. A handline specially designed for tuna in fish shelters is locally called *PALARAN*. In angling with live bait, a bait container (Fig. 33) is required.

IV-B. Pole and line (*BUNIT*)

This is a line with one or more hooks and with or without sinker tied to the distal end of a tapering bamboo pole. Various forms of pole and line are used in the Philippines. Using annelids, squid, fish, frogs and soft parts of hermit crabs (Fig. 34) as bait, the pole and line is operated in waist-deep waters along the beach, lake and river banks and fishpond and ricefield dikes. In Panay Island,

were believed to have come from mainland Asia, through land bridges. They are known variously as *AETA*, *AGTA*, *BALUGA*, *DUMAGAT*, etc. They wore very little clothing, had no permanent homes and no distinct language. They depended on nature for their livelihood. They gathered wild fruits, roots, tubers and honey for food. Most of their food were eaten raw or half-cooked (GAGELONIA, 1974).

pole and line is operated by men, women and even small children to meet family demands (Figs. 35 and 36). Grunters (*BUGAONG*), whiting (*OSOHOS*) and other littoral species are usually caught from the beach. *TILAPIA**⁶, freshwater catfish (*PANTAT*) and mudfish (*HALWAN*) are commonly caught from ricefields.

IV-C. Troll line (*PALABAD*)

In San Joaquin, a troll line (*PALABAD*) is operated from a sailboat (Fig. 37) to catch large fishes like tuna, mackerel, and swordfish. The bait is a small fish into which body a single large hook is securely embedded (Fig. 38). Nowadays, the line is of nylon monofilament; before the war, it was rope. Fishermen claimed that trolling at high speed is preferable (actually, they could not control their speed) for then the bait will toss and turn most attractively on the line's swivel. A *KAM-ANG* is used to hook the catch once it is near the boat.

IV-D. Longlines (*LABAY, KITANG, KALWAY*)

Both the set and drift longline are used in the Philippines. According to RASALAN (1952), the set longline is of local origin and the drift longline is a Taiwanese-type gear used to catch subsurface fishes like tunas. Longlines are among the most popular gears in Panay and neighboring islands. It is very common to see fishermen busily baiting their hooks and arranging their lines during the day. Longlines can get a variety of fishes, including mature milkfish (*SABALO*).

A longline with fiber lures instead of bait is popular in Panay. It is locally called *INTU-INTU* or *SIBID* and is operated vertically and hauled many times, in daytime. Fishermen use a certain white synthetic fiber which they tie to the hooks with red-colored thread (Fig. 39). Underwater, the white fibers look light-violet; together with the red binding at one end, the net effect is, according to the fishermen, that of a shrimp or similar organism, moving through the water and very attractive to fishes. This line is usually operated from a small non-motorized boat. Sometimes, feathers are attached to the hooks together with the synthetic fibers.

The longline for yellowfin tuna (*PANIT*) is operated in the waters around Guimaras. This was introduced from Japan after the war and is called by its Japanese name *SHIBI-NAWA*.

In Tigbauan, a longline is operated from shore in daytime. The gear has synthetic fibers attached to hooks and a line attached to a wooden fish-shaped kite, *PALYAW* (Figs. 6 and 40).

The bottom longline (*KALWAY, LABAY*) for dogfish shark (*BAGIS*) is operated in Tibiao, Patnongon, San Joaquin and Tigbauan. Sharkfishing was introduced by the Japanese in 1976. Shark liver oil and shark fins are fast becoming products

*⁶ *Tilapia, Sarotherodon massambicus* (PETERS), was introduced to the Philippines from Bangkok, Thailand by D. V. VILLADOLID in May, 1950. A few of this species were brought to Dagatdagatan Saltwater Fisheries Experimental Station where they were reared. They bred easily and several thousands of fry are now being distributed to different government institutions and to private raisers for propagation (ACOSTA, 1952).

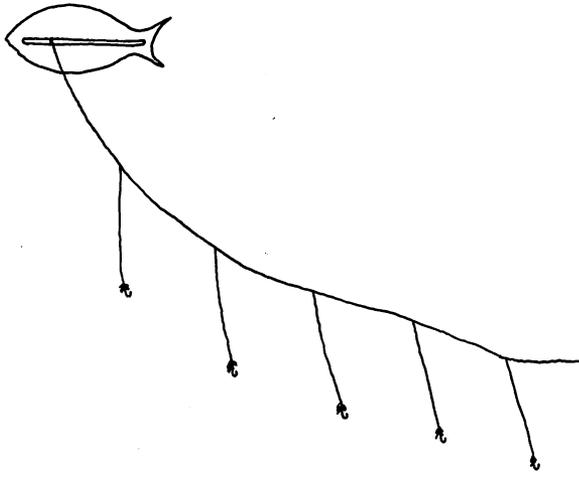


Fig. 6. Beach-operated longline with kite (Tigbauan, Iloilo).

of great commercial interest in Panay. The *KALWAY* or *LABAY* is set at depths of 200–300 m usually around midnight and hauled around 0400 H, but it could be operated even in daytime if the weather is good. The lines may be of monofilament or of nylon ropes and fine wire; the main line has about 200 large hooks (Fig. 41). Fishermen who operate at night utilize float with kerosene lamp (Fig. 7A) as markers.

Longlines always have markers/floats/bite indicators. In New Washington, fishermen use bamboo float-bite indicators. The longline is tied to a glass bottle inside which is hanging a coral pebble (Fig. 7B). When fish are hooked, the line becomes taut, the bottle shakes and the pebble strikes a sound for the waiting fisherman.

IV-E. Jigs

In line fishing, the hook itself can act as a bait. Some fish are attracted by sparkling hooks; they seem to regard them as prey, snap at them and thus are often caught. Unbaited hooks, in addition, could also be used on quite different principles. They may be so arranged such that they are then no longer passive hooks taken by the fish, but are actively guided so that their points pierce, spear or rip up a fish coming within range. A gear of such design becomes a jig, wherein the hook is not used as a carrier of bait nor even as bait itself. Its movement at most arouse the attention of the fish and may attract it (TAMURA, 1952).

In such manner, squid (*LOKOS*) and cuttlefish (*BAGOLAN*) are lured and captured by jigs. In Panay and neighboring islands, there are two types of squid jigs. One common in the Estancia area is the handline with a wooden lure (*SIBID*, *LUKON-LUKON*) shaped like a prawn (*LUKON*) having two series of barbless hooks at the tail portion. The lures have much variation in size, color, shape, weight, depending on the fishermen's preferences and previous experience

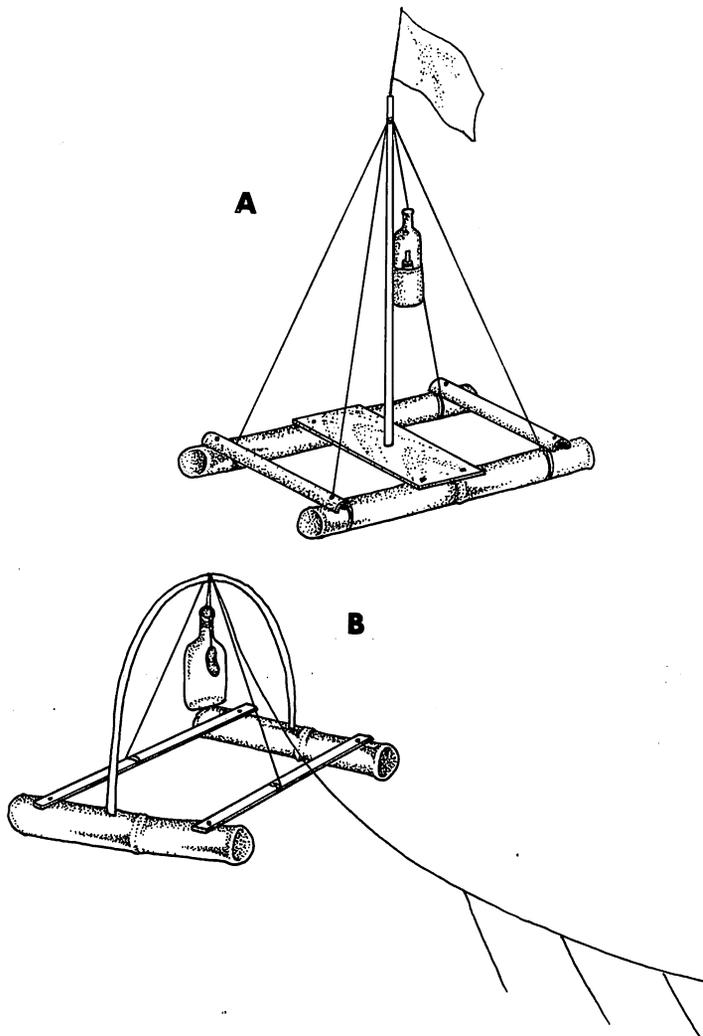


Fig. 7. A, Float with small kerosene lamp used with bottom longline for shark; B, Float-bite indicator for longline (New Washington, Aklan).

(Fig. 8). The fishermen prefer the wood of the jackfruit (*NANGKA*), *Artocarpus integra* (Fig. 42) as material for the lure, because of its alleged durability and attractive smell. In Japan, squid jigs of the type just described have been used since about 200 years ago. Japanese fishermen believe that the origin of this jig is in the southern islands of Kagoshima Prefecture, but there is no factual record (OKADA, 1978). The fishermen in Estancia claim that the lure is of local origin. The other type of squid jig is a line with conventional multipointed barbless hooks with feathers tied to their proximal ends (Fig. 9). As the fishermen believe that squid and cuttlefish have no color preference, they use feathers of any color.

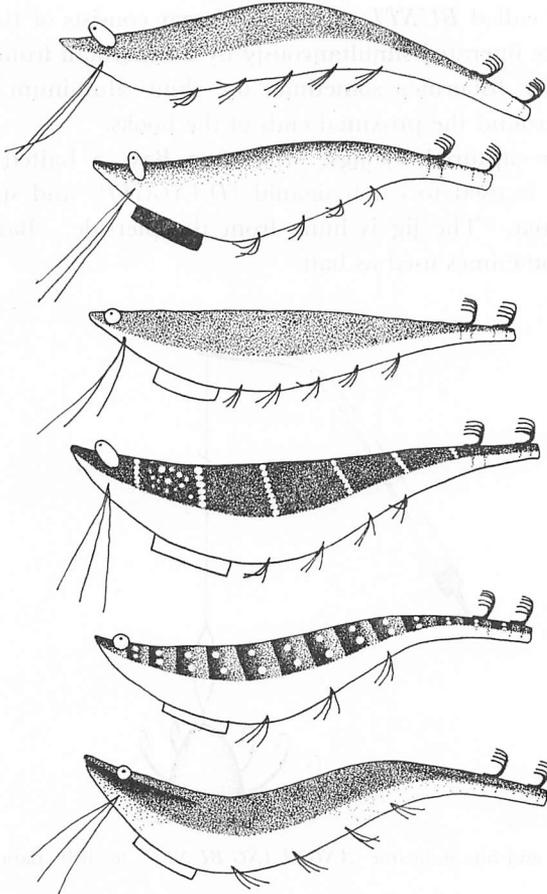


Fig. 8. Squid jigs (*LUKON-LUKON*) showing variation in shape and color pattern (Naburut and South Gigante Iss.).

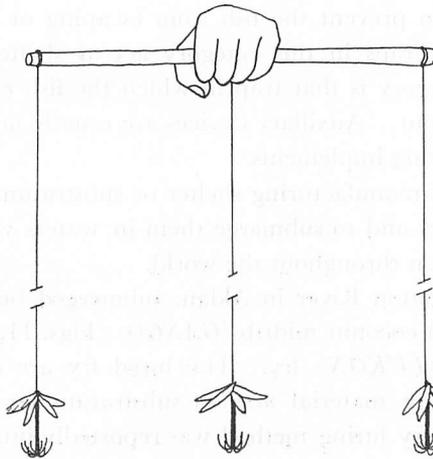


Fig. 9. A set of squid jigs with feathers (Batan, Aklan).

This jig is locally called *BUNIT*. One set of gear consists of three jigs hung from a bar; two sets are operated simultaneously by a fisherman from a stationary boat. Instead of feathers, fishermen sometimes use shiny aluminum paper of cigarette packs, wrapped around the proximal ends of the hooks.

Fishes are also captured by jigs. In Batan Bay, a baited jig (*ANGKLANG BUNIT*, Fig. 10) is used to catch siganid (*DANGGIT*) and spadefish (*KIKIRO*) from the dock area. The jig is hung from the pierside. Banana and left-over cooked rice are sometimes used as bait.

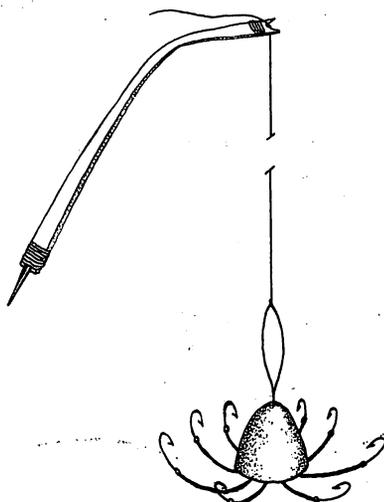


Fig. 10. Jig and bite indicator (*ANGKLANG BUNIT*) for fish (Batan, Aklan).

V. Traps

Traps include two categories of gears. One is that by which fish are lured to or gathered around of. To prevent the fish from escaping or to capture them, other implements are used. Traps in this category act as shelter or substratum, or as barrier. The other category is that trap in which the fish enters voluntarily and is prevented from coming out. Auxiliary devices are usually not used in these traps.

V-A. Submerged luring implements

A simple method of manufacturing shelter or substratum is to bundle grasses or twigs of shrubs or trees and to submerge them in waters where fishing is desired. This method is common throughout the world.

In the New Washington River in Aklan, submerged bundles of grass, twigs of *TUNGO-TUNGO* and coconut midrib (*GANGO*) (Figs. 11, 43 and 44) are used to lure *Penaeus monodon* (*LUKON*) fry. The lured fry are captured by scoop net (Fig. 45). The alluring material acts as substratum for the fry which have a clinging habit. This fry luring method was reportedly introduced from Cabugao, Capiz.

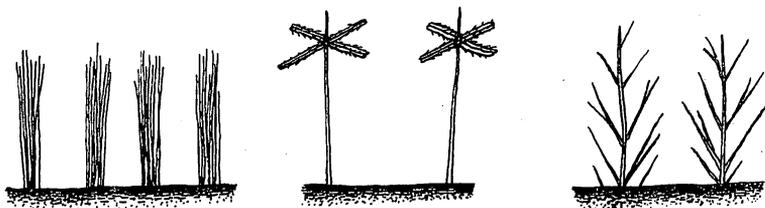


Fig. 11. Submerged lures for prawn (*Penaeus monodon*) fry (Batan Bay, Aklan).

It is well known that pelagic fishes and juveniles of benthic fishes are attracted by drifting objects and often associate with them. Many observations have been carried out and many hypotheses have been forwarded regarding the mechanism of the association of fish with drifting objects. Among the reliable ones are: (1) the object functions as a schooling companion for the fish (HUNTER and MITCHELL, 1966); (2) for species not adapted to a pelagic life, or others undergoing a change from a pelagic to other modes of existence, drifting materials may function as a substitute for a reef or other substrate (HUNTER and MICHELL, 1966); (3) floating materials provide protection from predators (SUYEHIRO, 1952; SOEMARTO, 1960; GOODING and MAGNUSON, 1967); (4) floating materials act as a cleaning station (EIBL-EIBESFELDT, 1955; LIMBAUGH, 1955, 1961; RANDALL, 1958; GOODING and MAGNUSON, 1967).

Off the coast of Antique, moored raft shelters (*PAYAW*) (Fig. 46) are set in fishing grounds some tens to 300 m deep to attract migratory pelagic fishes. The attracted fishes are caught by purse seine or more commonly by handline. The *PAYAW* consists of a raft made of 1-3 layers of bamboo poles (Figs. 47 and 48) beneath which hangs a line to which are attached fresh or dried leaves of banana, coconut, or most commonly, of buri palm (*BURING*), *Corypha elata* (Fig. 49). Buri palm leaves are much preferred because of their durability, and are used preferably dry because they are lighter to transport and smell more attractive when dry. One raft assembly lasts 3-4 months, after which time it allegedly loses its attractive properties and has to be replaced. The construction and use of *PAYAW* are said to have been introduced from Cebu Island. In Guimbal, Iloilo, 5 fishing companies are engaged in making *PAYAW* for use in Mindanao, Sulu and Palawan; nowadays, three-layered rafts with 36 poles to a raft are in popular use.

Similar moored rafts can be seen in Japan (for attracting dolphinfish) and Indonesia. The Japanese method is considered to have been introduced from a southern country in the olden times (KOJIMA, 1966).

V-B. Barriers

Many fishing gears have been developed in areas with changing water levels all over the world.

V-B.1. Stone dams

In Panay and neighboring islands, stone dams of a large variation in scale are built along the seashore. Stone dams are so arranged that they are flooded at high water and the fishes can enter them; then as the tide falls, some fishes are retained (Fig. 50). The actual catching of the fish has to be done by hand, spears or scoop nets.

V-B.2. Fish fences

Fish fences are set in the intertidal areas. Nylon netting or split bamboo matting are usually used as they could be easily removed and transported. In mangrove areas, fish fences are set near the roots of trees (Fig. 51) in the manner of a barricade; the fishes among the roots are captured by scoop net. In prawn fry collection grounds, fences are so set against the current that the fry are retained by them (Fig. 52).

V-B.3. Fish corrals

BRANDT (1972) used the term "labyrinth trap", but we think "fish corral" is more appropriate. Fish corrals are very widely used in the Philippines and have great variation in scale and design. OBISPO (1978) illustrated 36 variations. Fish corrals are locally called *PUNOT* or *TANGKOP*; small ones in rivers or creeks are called *SARADA*.

The relatively small fish corrals used in rivers and estuary-lagoons have no leader. A typical one consists of two wings, an antechamber and a terminal chamber or box trap (Fig. 53). It is usually set at the deepest portion between banks to catch freshwater or brackishwater species.

A typical deep-water fish corral is a fish trap set about 10–15 meters deep at strategic points along the coast. It consists of a series of three enclosures or chambers, flanked by two wings, and a prolonged leader set perpendicular to the shoreline (Fig. 54). The set-up is made of bamboo poles and slabs of split bamboo. A big fish corral uses about eleven thousand bamboo poles and takes 16 workers more than one month to build (Figs. 55–57).

When fishes swimming along the coast encounter the leader, they are diverted and led into the ante-chambers (*BULON*). The fishes in the ante-chambers are driven into, concentrated, and captured in the terminal chamber (*PASIGARAN*) with a seine net. The chambers are thus designed such that the seine net could be easily operated. The operation is repeated one to three times depending on the amount of catch from before midnight until sunrise. The gear is maintained and operated by 12–16 men.

Fish corrals are put up where and when they would be sheltered from the strong monsoon winds. Thus, in the southern and western coasts of Panay, the season of operation is from December to June, which is northeast monsoon time, the relatively calm months in these areas. Starting June when the southwest monsoon blows, fish corrals spring up in the northern coast. During the season of operation, running repairs are undertaken — slabs of split bamboo are

replaced every month, the used ones dried.

Fish corrals built in shallower waters have a box trap at the end of their terminal chambers. To harvest the trapped fishes, the fishermen seal the box trap and haul it to shore every morning (Figs. 58-60). The catch includes various fishes, shrimps, prawns, and crabs. Slab of split bamboo is gradually being replaced by nylon netting in many shallow-water corrals.

Fish corrals are traditional gears. They are apparently inefficient since the fish that has gone inside can easily find its way out again. This has led many fishermen into believing that Japanese trap nets like the otoshi-ami are much more efficient than the traditional fish corrals. Such is not strictly true, however. HIRAMOTO (1969) reported that when the trapped fishes were tagged and released in the bag net of the otoshi-ami in 7 fishing grounds, the ratio of recapture the next morning ranged from zero to 11.7%; in four of seven tests, there was no recapture. The otoshi-ami was introduced to the Philippines as part of the Japanese reparations program. Several otoshi-ami are in operation in the northwestern and northern coasts of Panay, almost the whole year round since they are less susceptible to rough sea conditions than are bamboo fish corrals.

At the outlet of fishponds and across creeks and canals, small fish traps are set to capture shrimps and fish. These traps usually consists of two wings and one chamber or box trap (Figs. 61-64).

V-C. Baskets (*BOBO*, *PANGGAL*, *BINTOL*, *TAON*)

Baskets include pots, fyke nets and tubular traps with or without non-return devices. It is believed that these traps were originally devised independently in several southern (i.e., tropical) areas. Thereafter, the underlying principles spread throughout the world and variations came up as a result of adaptation to the local fishing conditions. These traps were originally operated in inland waters (YABUUCHI, 1978).

In Panay and neighboring islands, baskets are used to capture crabs, shrimps, prawns and small fishes from fresh-, brackish- and littoral marine waters. The various types of baskets presently used are shown in Figs. 65-75.

While baits are placed inside baskets used to lure carnivorous fishes and crabs, none is used in baskets for herbivorous fishes like siganids. However, in New Washington, fishermen put a piece of broken plate inside baskets for herbivorous fishes (Fig. 70). This idea seems to have come from Muslim fishermen. Carnivorous fishes enter baskets to feed on the bait; herbivorous fishes do so because of their thigmotaxis or because the basket functions as a shelter.

The fyke net used in the sea could not be seen anywhere in Panay but the type with wings is used in Tigbauan, Iloilo to harvest cultured prawns from ponds (Fig. 75).

VI. Scoop, skimming and filter bagnets

These are classified as bag nets by BRANDT (1972), but if his principle of classification is strictly adhered to, these should be classified as filter nets because the manner of capture is by straining fish from the water. Filter nets are bags of netting (originally wood) which are kept open vertically by a frame on the opening side and horizontally by the current. Smaller types like scoop nets are moved through the water on the same principles. In Panay Island, filter nets are used for catching small fishes or shrimps. For bigger fish, filter nets can be used in such manner that when the fisherman feels a fish strike the net, he quickly lifts it out of the water.

VI-A. Scoop nets (*SIBUT*, *SAPYAW*)

Scoop nets have much variation in form and design depending on the purpose of use, and the local availability of materials for the frame. Fig. 12 illustrates some common forms of handy scoop nets whose frames are made of flexible branches of shrubs and trees. Scoop nets may be used as the main gear or as an auxiliary device in a fishing operation.

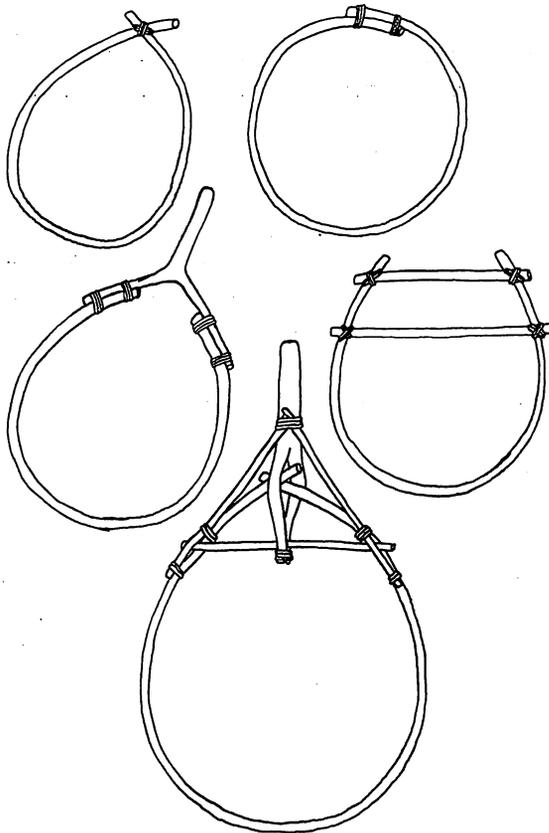


Fig. 12. Variation of the frame of small scoop nets (Panay Island).

VI-B. Skimming nets

These are triangular nets with two crossed poles which may be fixed or movable. With fixed poles, the net is kept permanently open; with movable poles, the net bag is closed or opened as desired.

Skimming nets may be small and hand-operated or big and motor-driven. The size of the hand-operated skimming net (*SUDSUD*, *HUDHUD*) is limited by the power of the fisherman. The smallest ones are usually of the fixed kind (Fig. 13A)

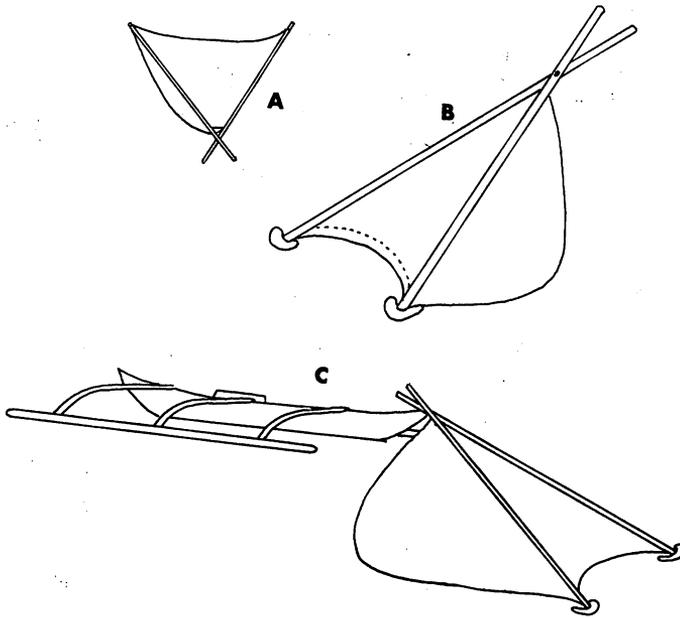


Fig. 13. A, Small skimming net (Hamtik, Antique); B, Skimming net with sleds (Panay Island); C, Motorized skimming net (New Washington, Aklan).

and can be operated even by small children to catch prawn and milkfish fry from mangrove areas, creeks, and similar backwaters. Skimming nets with sleds at the front ends of the poles (Fig. 13B) are very popular in catching small chrimps as well as prawn and milkfish fry. The bigger skimming nets are pushed by motorized boats. In New Washington, these motorized skimming nets are called *SAGUDSUD* (Fig. 13C) and are used to catch small shrimps and fish. In Banate and Tigbauan, the motorized skimming nets have long bags (Fig. 76) and are called *SUNGKIT* or *SANDOK*. These seem to have been introduced to Tigbauan about 8 years ago from Cagayan de Oro in Northern Mindanao and from Tigbauan to Banate very shortly thereafter. The catch is largely small shrimps (*Acetes* spp. and mysids) that are salted and marketed as *GINAMOS HIPON*.

VI-C. Filter bagnets (*SALURAN*, *PALUPAD*, *TANGAB*)

These are bagnets set or moved against currents. They have wings of netting, bamboo matting or leaves and branches.

Filter bagnets locally called *SALURAN* or *PALUPAD* are fixed, with the mouth open, to a row of coconut trunks or bamboo poles set in relatively deep waters with strong tidal currents. Some have no wings at all (Figs. 14A and 77) while others have 12 m long wings of large mesh netting in front of a 30 m long fine mesh bag. The operation can be in both direction, as the bag will just reverse with the current.

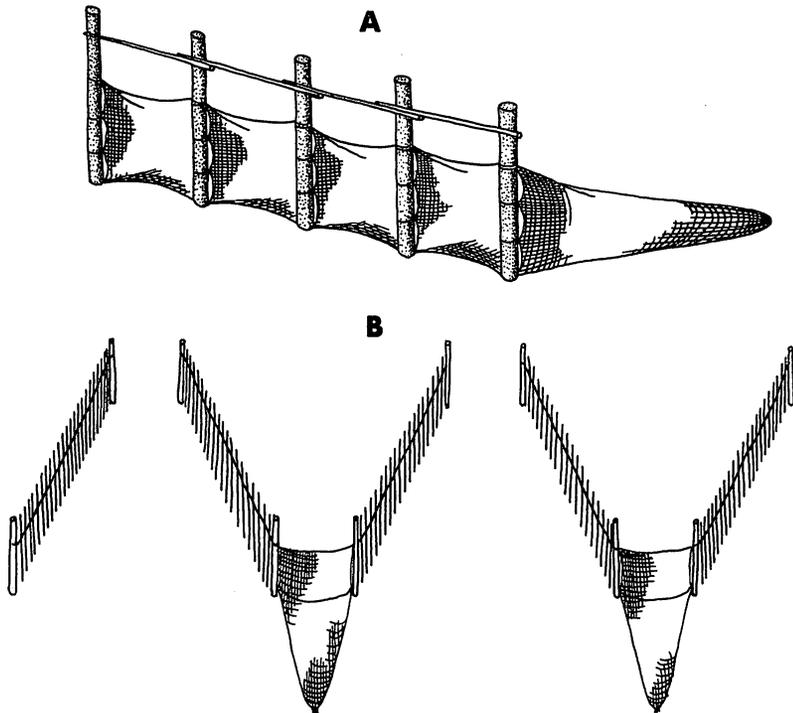


Fig. 14. Filter bagnets. A, *SALURAN* or *PALUPAD*; B, *TANGAB* (Batan Bay, Aklan).

Filter bagnets are fixed at the narrow end of V-shaped semi-permanent wings of bamboo poles (Fig. 14B) and are called *TANGAB*. They may have no wings, or may have 12 m long wings of large mesh netting before the 40–50 m long bag. The *TANGAB* can not reverse with the current. Along Iloilo Strait, the wings of the *TANGAB* are so constructed that the bagnets can be transferred from the narrow ends on one side to those on the other as the current reverses.

Fixed filter bagnets in deep water are particularly highly successful with small shrimps and larval fishes which are salted for the market. Fishermen report that catch is bigger during the full- and new-moon periods because of the stronger currents and bigger water volume. The *TANGAB* in Iloilo Strait have been designed based on the ones first developed in Valladolid, Negros.

Filter bagnets with bamboo or net wings are also set in the deeper portion of rivers (Figs. 78 and 79), facing upstream, to catch fishes and shrimps as the water recedes. Across river mouths, filter bagnets with wings of split bamboo, or of

netting, leaves and branches (Fig. 80) are set facing the sea to catch milkfish and prawn fry with the incoming tide. Ones with wings of netting fixed to poles (*SAPLAD*, Fig. 81) are set along the shore facing the current, for the same purpose.

Fry sweepers (*BAKA-BAKA*) are gears specially designed for milkfish fry but they work just as well for prawn fry. The gear has a bamboo frame with wings and pouch of fine mesh net. It is pushed along the shore in fry collection grounds (Fig. 82). The fry collected in the bag are scooped with a basin (*LABADOR*). It has been contended (KAWAMURA *et al.*, in press) that milkfish fry can be captured with fry-sweeper not only by filtering but also by driving. The design of the fry-sweeper has many local variations (Fig. 15). Recently, fry-sweepers have come to be attached to outrigger pumpboats which can operate offshore and cover a wider area. In shallow river mouths, the fry-sweeper is fixed in position to filter and catch milkfish fry (Fig. 83). The opening so faces the waves that milkfish fry are guided by the V-shaped wings toward the bag. This operation is most noticeable during stormy days when fry are abundant and pushing is tedious and difficult.

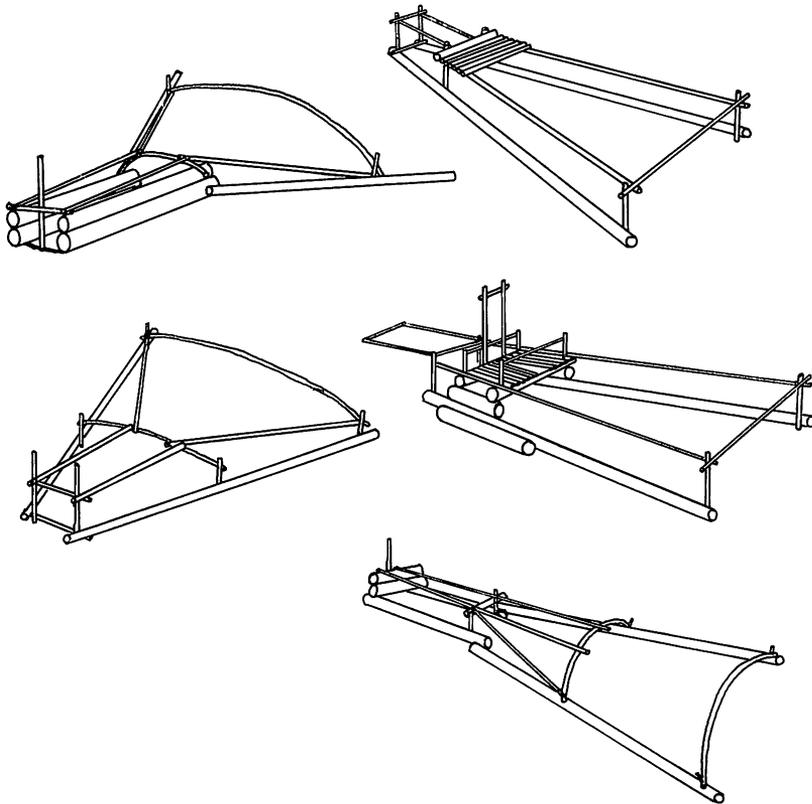


Fig. 15. Variation of the frame of fry sweepers (Panay Island).

Another type of fry-sweeper is the so-called "bulldozer", a bamboo raft with wings and pouch operated at night with a kerosene lamp. Two men board on the raft; one pushes it along with a bamboo pole, the other scoops the fry caught in the pouch.

VII. Dragged gears

This group includes all netbags or netwalls which are towed through the water on or near the bottom, or even pelagically, for an unlimited time. The manner of capture is by filtering the passive prey by an actively moved gear (BRANDT, 1972).

A small dragged gear with bagnet at one end (*SONGYA*, Fig. 84) is operated in rivers, nipa swamps and newly-harvested fishponds to get small fishes and shrimps (Fig. 85). The gear is dragged a short distance, with one foot driving the fish towards the opening, then lifted and shaken to let the fish fall into the bag. Sometimes, a contraption of strung-together coconut shells is used in driving.

No dredge could be found during the survey except one used for experiments in the SEAFDEC Aquaculture Department.

Trawl nets are very common in Panay Island; their catch makes up the great bulk of fish sold in the markets. Before the war, only the beam trawl and two-boat trawl which were both introduced from Japan, were used. After the war, these were replaced with otter trawl with oval-shaped boards introduced from the west coast of America. Recently, relatively small otter trawls operated from outrigger pumpboats have come into use for catching prawns, as in Barotac Viejo. In relatively shallow waters, the most commercially important catch of trawlers is prawn which are exported to Japan and some European countries. The main landing port of off-shore trawlers is Iloilo City.

VIII. Seine nets

The manner of capture is by surrounding a certain area and towing over this area a net wall with or without bag.

VIII-A. Double stick net (*SAGAP*, *SAGYAP*, *SAHID*, *SARAP*, *SALAP*)

The *SAGYAP* is a seine made of abaca net (*SINAMAY*) or nylon screen, operated by two persons along the beach or river banks to catch milkfish and prawn fry which are then scooped with a basin (Fig. 86). In Culasi, fry collectors have discarded the use of two poles, the net is just dragged along the beach with the hand and feet (Fig. 87). A similar seine is used to collect goby fry from near the river mouth (Fig. 88). Goby fry, locally called *IPON*, forms an important protein source in Panay. Sexually mature gobies migrate to the sea from rivers and stream to spawn. Periodic appearances of vast shoals of *IPON* during high tide occurs; the fish are taken at this time. In the northern coast of Cagayan Province, these occur nine days following the full moon each month from November to March (ACOSTA, 1952).

The filter bagnet with two bamboo poles is dragged for milkfish fry (Fig. 89).

A large-mesh double stick net without bag is operated along the beach by two fishermen (Fig. 90). The catching area is limited to a depth within the height of the net.

VIII-B. Beach seine (*SAHID, BALING, BITANA*)

All beach seines in Panay are of the same basic design: one bag, long wings, and warps which function as the scare lines. There are, however, many variations in scale. The small type is operated by only two fishermen. The larger ones are operated by 20–40 fishermen and can get a wide variety of fishes. Beach seining is done whenever a fish school is sighted. In many places, beach seines are operated at night with kerosene lamps to catch larval clupeids and anchovy; this method is called *SENSURO*. The catch is either salted or dried for the market.

IX. Surrounding nets

The manner of capture is to surround the fish not only from the sides but also from beneath, thus permitting the capture of fish over very deep waters by preventing their escape to the depths.

Purse seines (*LIKOP*) are operated by one or two net boats (Fig. 91). During the day, fishermen locate fish schools by observing surface disturbances such as a distinct patch of air bubbles. Fish finders are not yet used; the boats have a lookout platform on the main mast instead. Purse seines are also used to capture fish associating with moored rafts (*PAYAW*)

Many purse seines are operated at night using lamps. In this case, the operation is effected by a fleet of several light boats and one net boat (Fig. 92). Fish and squid are attracted by the lamps; they are subsequently surrounded. Electric lamps are now very commonly used with purse seines but kerosene lamps are still popular (Fig. 93). Purse seine light boats are locally known as *KUBKUB*. In the open sea fishing grounds, modern fleets operate purse seines. The fleet consists of two carrier boats, one net boat and 3 light boats (Fig. 94).

X. Drive-in nets

Drive-in nets have many advantages: 1) they can be operated in the coral reef areas where nets can not be dragged because of the rough bottom; 2) they can be operated in many places several times a day; 3) widely dispersed fishes can be captured by driving them into nets set previously; 4) the fishes that are caught can be killed at once. The last one is of great importance, especially in tropical and subtropical waters.

The quantity of fishes actively entering passive gears is so small in relation to the time unit that the gears have to remain set for a very long time till the profitable catch is produced. The fish caught first would die very quickly in warm waters and would then no longer be commercially valuable when the gear is hauled. For these reasons, drive-in nets have developed in, or have been introduced into many tropical or subtropical areas.

In deep waters, fishes are driven by swimming or diving fishermen. This can also be done with the help of scare lines. One of deep-water drive-in net is the *MURO-AMI* which was introduced from Japan to all over the South Pacific and to the Philippines by Itoman fishermen (SAITO, 1932; UEDA, 1974, 1975; ISHIKAWA, 1974; KONO, 1974). In shallow waters, fishes are driven in by rows of wading and splashing people, by poles and paddles striking the water, by casting stones, by towing scare lines, or by two boats moving towards the set gear.

A small drive-in net (*INAT*) for goby is operated by only one fisherman in waist-deep waters (Fig. 95). The gobies are captured by driving them with a line hung with coconut leaves, into a set net triangular in design.

A drive-in net (*PATIGBI*) for mullets (*BANAK*) is operated in the New Washington River. Five fishermen cooperate: three of them hold the net in dustpan shape; the other two tow the scare line made of coconut husks toward the net (Fig. 16). This gear was said to have been introduced in New Washington from neighboring Basiao.

Moderate to large drive-in nets operated in coral reefs are commonly known as *SALAMBAW*. Large-scale *SALAMBAW* fishing is done in Panagatan Cays off northwestern Panay. A group of some 20–40 migrant fishermen make a living off the great variety of fishes from the Cays which they dry (*BULAD*) or store in brine (*TINABAL*) and market in Cebu. The scare line is of coconut leaves strung together several hundred meters long. Some of the cooperating fishermen dive to drive the fish, the others maintain, move and manage the scare line; some strike and splash the

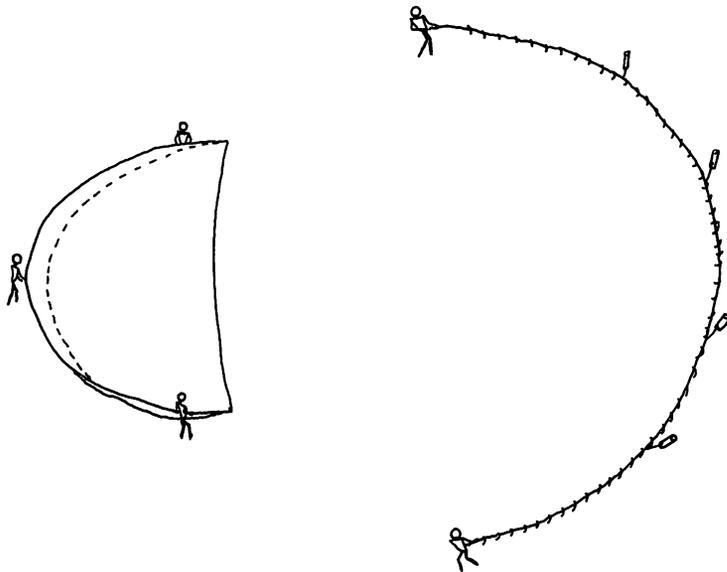


Fig. 16. Illustration of the operation of drive-in net (*PATIGBI*) for mullet (New Washington, Aklan).

water. Fishes from a very wide area of the Cays are driven into a big net set at one point. A cursory sample of one *SALAMBAW* haul from Panagatan Cays was composed of about 70 coral reef species. The *SALAMBAW* is also popular in places near Estancia (Fig. 96). The operation of this drive-in net is similar to that of the *ABUYAN* (Fig. 17) as described by CAPCO and MANACOP (1953).

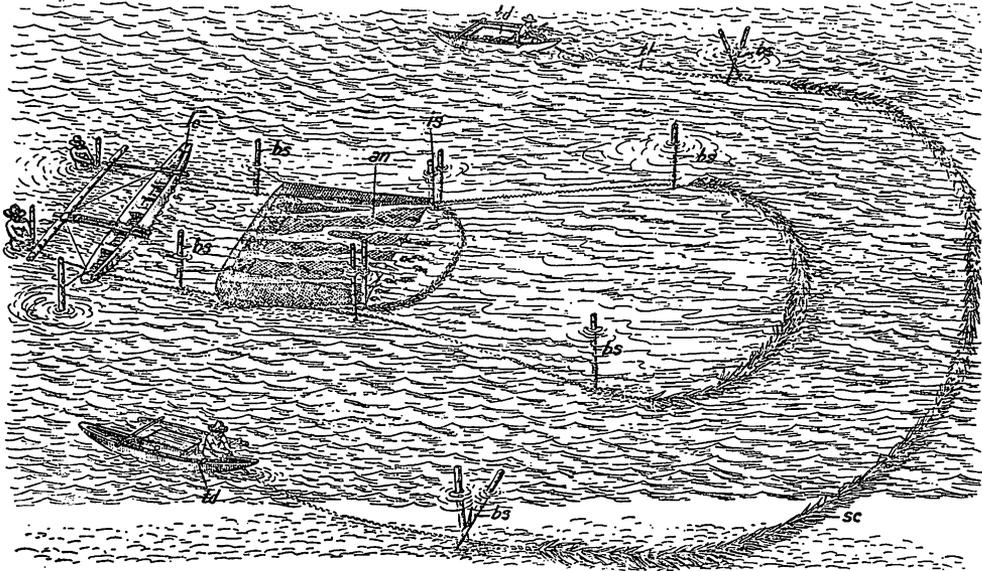


Fig. 17. *ABUYAN* in operation (From CAPCO and MANACOP, 1953).

XI. Lift nets

Lift nets are sometimes called dip nets. Strictly speaking, the term "dip nets" is not correct. Capture is done not by dipping nets but by lifting them from the water when the fish sought to be caught have gathered over them. The term "lift net" is therefore more correct. Though lift nets themselves are passive and inefficient gears, once they are operated with alluring baits or fish lamps, they become extremely efficient. Lift nets can be used in shallow and deep waters.

The lift net (*PANAK*, Fig. 97) especially designed for chambered nautilus (*LAGANG*) is operated on dark nights at depths of 120–150 meters, and lifted about 10 times a night. Frog meat is most commonly used as bait, chicken meat second. Chambered nautilus, *Nautilus pompilius* (LINN.) is valued for its unusual shell which sells, direct from the fishermen, at ₱7–8 each. Lobsters can be captured together with the nautilus.

The crab lift net with bait box (*BINTOL*) (Fig. 98) is used in inland waters to capture mud crab, *ALIMANGO*, *Scylla serrata*. It is sunk to the bottom 5–7 meters deep. *ALIMANGO* is attracted by the bait and is thus caught when the *BINTOL* is lifted.

In Batan Bay, large lift nets with kerosene lamps (*BINTAHAN*, *TANGKAL*) are operated at night (Fig. 99). A box-shaped net hung from a platform of bamboo poles is sunk to or near the sea bed. When enough fish have been attracted by the kerosene lamp set above the center of the net, the latter is lifted by hauling the hanging lines by means of two drums. After collecting the catch with a long-handled scoop net, the net is sunk again. Anchovy, mullet, slipmouth, barracuda are among the catch. The *BINTAHAN* is of strictly the same construction and operation as the Indonesian lift net *BAGAN*.

The boat-operated lift net *BASNIG* (Fig. 100) is very popular in Capiz and Iloilo provinces. The *BASNIG* is reported to be of Philippine origin, and the *BALASNIG* its forerunner (RASALAN, 1959). The modern *BASNIG* boats are equipped with high-speed engines, a generator, and specially constructed electric bulbs. Bamboo booms, 3–6 m long, are installed along the sides, held in place by stays and shrouds supported by an auxiliary mast. The temporary booms which spread the net under the boat as well as the auxiliary mast are detachable and are set only in the fishing ground.

XII. Falling gear

The manner of capture is to cover the fish with a gear. This can be done without difficulty in shallow waters but there are records of operation in deep waters.

Cast nets with and without pockets are used in Panay in rivers (Fig. 101), ponds and sea. The cast net is believed to have originated in India (YABUUCHI, 1978); it is now used all over the world. In Panay, it is not so popular, owing probably to the availability of many other gears.

Cover pots made of bamboo (Fig. 102) used to be popular gears in rivers in Panay Island, for catching freshwater fish, shrimps and prawn (among them *Macrobrachium*). In intertidal areas, the cover pot is operated with a kerosene lamp at night. The fish attracted to the light are covered with the pot and removed by hand through the upper opening. Cover pots are fast going out of use because of the pervasion of modern gears.

XIII. Gill nets (*PUKOT*, *LAMBAT*, *PATULOY*, *PANTI*)

Gill nets are single-walled nets with a mesh opening of such a size that the wanted fish can gill themselves in the netting. This is a passive gear, but fish can also be driven into gill nets.

Gill nets are the most popular gear in Panay and probably in the entire Philippines. They can be seen and are operated in all fishing villages (Fig. 103). Drift and bottom gill nets are made of monofilament or multifilament thread, lead weight, and floats of any available material — rubber sponge, wood, bamboo or bottles. In shallow waters, *TUMBOK* with or without handles (Figs. 18 and 104). are used to drive the fish into the nets. *TUMBOK* was originally made of half-cut coconut shells; nowadays, wooden or rubber balls are used.

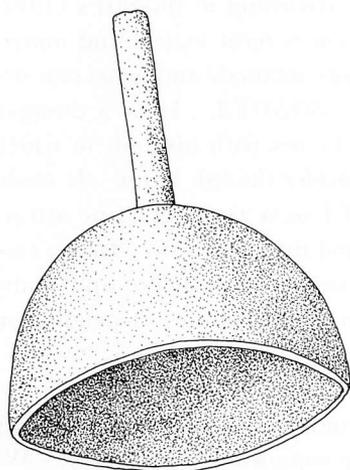


Fig. 18. *TUMBOK* for driving fish into gill nets (Naburut Island).

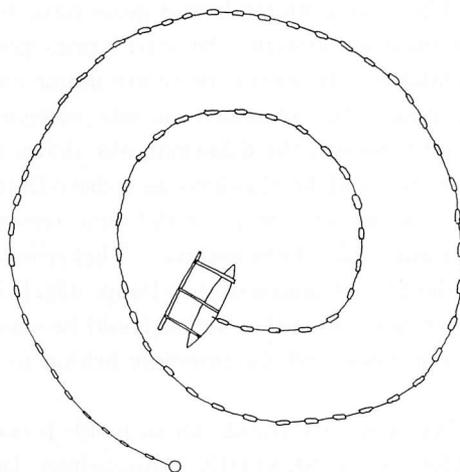


Fig. 19. Illustration of the operation of encircling gill net for mullet (New Washington, Aklan).

Gill nets have wide variation in scale and mesh size and can get many kinds of fish. Large mesh gill nets can bring in adult milkfish. SAITO (1942) reported a gill net 22–24 m deep, 150–600 m long, called *KABU-KABU* in Panay and used to catch sardine, anchovy and mackerel. There are indeed many of these big gill nets, operated from motorized boats.

Encircling gill nets (*LIKOM* or *LIKOP*) used to capture anchovy and sardine, are made of multifilament 5 meters high, 150 meters long. Gill nets are also used to encircle mullet schools; the gilled mullets are captured by diving fishermen (Fig. 19).

Remarks

We tried to survey and observe all the fishing methods and gears in and around Panay Island. However, it is certain that we missed some of them. For one, we were restricted in our time schedule. Then there are gears that are operated seasonally. Also, many methods and gears have become “extinct”, or at least so superseded by modernized ones that their current practice and use are difficult to track.

It was our primary purpose to record the fishing methods and gears used in Panay in the past and at present — for the future. We tried to trace their origin but did not have enough time. Nevertheless, this report is a contribution in that direction.

The report presents mostly our own observations. We did read as many publications as were available. Unfortunately, most of them dealt primarily with the commercial and modernized fishing gears (UMALI, 1950; MANACOP, 1975; RASALAN, 1952; CAPCO and MANACOP, 1953). References on the simple subsistence fishing methods and gears are few and hard to find. The present report should be revised and completed by further surveys.

The fishing methods and gears have been arranged according to BRANDT's (1972) classification system. BRANDT's principle of classification is most logical and understandable. However, there are minor difficulties. Some methods and gears can not be reasonably classified in one category. Take the *SONGYA*. It is a dragged gear; however, the fisherman also drives the fish into the net with his foot, in which case, it could be classified as a drive-in net. Then consider the fish lamp. It could be classified as a trap for the same reasons that *PAYAW* is a trap. Lamps attract fish and hold them captive. Flickering lights scare and drive the fish. In the case of the lift net used with fish lamp, which really is the main gear? These and many other cases show that a gear could be classified under many categories, depending on its operation and the principle behind its effect.

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References

- A. F. UMALI: Guide to the classification of fishing gear in the Philippines. *U. S. Fish and Wildlife Service, Research Report*, **17**, U. S. Govt. Print. Off., Washington, 1950, 165 p.
- A. von BRANDT: Classification of fishing gear. in "Modern fishing gear of the world" (ed. by H. KRISTJONSSON). Fishing News (Books), London, 1959, pp. 274-296.
- A. von BRANDT: "Fish catching methods of the world". Fishing News (Books), London, 1972, 240 p.
- C. LIMBAUGH: Cleaning symbiosis. *Sci. Am.*, **205**, 42-49 (1961).
- E. D. MERRILL: "An enumeration of Philippine flowing plants," Vol. 1-4. A. Asher and Co., Amsterdam, 1967.
- F. B. REGALADO and Q. B. FRANCE: in "History of Panay" (ed. by F. V. GRIÑO). Central Philippine University, Iloilo, 1973, pp. 76.
- F. UEDA: in "Our sea, the greatest blessing" (ed. by C. ASHTOMI *et al.*). Okinawa Prefecture Tourist Development Corporation, Naha, 1975, pp. 140.
- I. EIBL-EIBESFELDT: Über Symbiosen, Parasitismus und andere besondere zwischen-artliche Beziehungen tropischer Meeresfische. *Z. Tierpsychol.*, **12**, 203-219 (1955).
- J. E. RANDALL: A review of the labrid fish genus *Labroides*, with descriptions of two new species and notes on ecology. *Pacific Sci.*, **12**, 327-347 (1958).
- J. M. WATT and Ma. G. B. BRANDWIJK: "The medical and poisonous plants of Southern and Western Africa." E. and S. Livingstone Ltd., 2nd ed., 1962, 1457 p.
- J. R. HUNTER and C. T. MITCHELL: Association of fishes with flotsam in the offshore waters of Central America. *Fish. Bull.*, **66**, 13-29 (1966).
- M. KONO: Panay-to no engan-gyogyo (Prompt report). *Hiroshima Shudo Daigaku Sogo Kenkyujo Report*, **3/4**, 22-41 (1979) (in Japanese).
- P. A. ACOSTA: Inland fisheries of the Philippines. in "Philippines fisheries" (ed. by D. V. VILLADOLID). Bureau of Fisheries, Manila, 1952, pp. 91-99.
- P. A. GAGELONIA: "Philippine history". National Book Store Inc., Manila. 1974, pp. 16.

- R. C. OBISPO: Some municipal fishing gears used in the Philippines. Fishing Technology Section, Bureau of Fisheries and Aquatic Resources Regional Office, No. VII, Cebu City (Mimeographed), 22 p.
- R. E. HOLTUM: "Plant life in Malaya" 2nd ed., Longman Ltd., London, 1969, pp. 104.
- R. M. GOODING and J. J. MAGNUSON: Ecological significance of a drifting object to pelagic fishes. *Pacific Science*, **21**, 486-497 (1967).
- S. B. RASALAN: Fishing gear commonly used in Philippine fishing. in "Philippine Fisheries" (ed. by D. V. VILLADOLID). Bureau of Fisheries, Manila, 1952, pp. 53-69.
- S. B. RASALAN: The development of the Philippine bagnet (*Basnig*) for increased efficiency. in "Modern fishing gear of the world" (ed. by H. KRISTJONSSON). Fishing News (Books), London, 1959, pp. 418-421.
- SOEMARTO: Fish behaviour with special reference to pelagic shoaling species: Lajang, (*Decapterus* spp.). *Proc. Indo-Pac. Fish. Conc., Colombo, Ceylon*, 1958, No. 8, Sec. III, 89-93 (1960).
- S. KOJIMA: Fishery biology of the common dolphin, *Coryphaena hippurus* L., inhabiting the Pacific Ocean. 1966, 108 p. (in Japanese).
- S. OHTA: Okinawa no jinshu to fuhzoku. in "Okinawa fuhzoku zue", Toyodo, Tokyo, 1896, pp. 1-2 (in Japanese).
- S. SAITO: "Nanpo no suisan". Tokyodo, Tokyo, 1932, pp. 97-107 (in Japanese).
- S. SUYEHRO: "Textbook of ichthyology". Iwanami Shoten, Tokyo, 1952, 332 p. (in Japanese).
- T. ISHIKAWA: Kaigai-imin no tenkai. in "History of Okinawa Prefecture" (ed. by Board of Education, Okinawa Prefecture), Okinawa Prefecture, Naha, 1974, pp. 332-361 (in Japanese).
- T. TAMURA: On the senses of food-searching in *Lateolabrax japonicus* (TEMMINCK and SHLEGEL). *Bull. Japan. Soc. Sci. Fish.*, **17**, 296-300 (1952).
- T. TACHIBANA: Kuruma-ebi no yoshoku gijutsu. in "Senkai kanzen yoshoku" (ed. by T. IMAI). Koseisha Koseikaku, Tokyo, 1971, pp. 397 (in Japanese).
- Y. HIRAMOTO: On the chuteiso-trap net operated in Maegawa fishing ground. *Trap net fisheries*, **40**, 20-29 (1969) (in Japanese).
- Y. OKADA: "Lures for squids and cuttlefish in Kagoshima Prefecture, Japan." Uchida Rokuho Shinsha, Tokyo, 1978, 100 p. (in Japanese).
- Y. YABUCHI: Study on traditional fishing methods. in "Gyoro-bunka jinruigaku no kihonteki shiryō to sono hosetsu-teki kenkyū" (ed. by Y. YABUCHI), Kazama Shobo, Tokyo, 1978, 744 p. (in Japanese).

Explanation of Figures

- Fig. 20. Groping for gobies in a harvested fishpond (Roxas City, Capiz).
- Fig. 21. Removal of oysters from rocks exposed at low tide, by pick (*HONSOL*) (Iloilo River, Iloilo City).
- Fig. 22. Use of a farm knife (*BINANGON*) to prize oysters loose (Iloilo River, Iloilo City).
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