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THE MARKETING AND PROCESSING OF FISH IN THE PHILIPPINES

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INTRODUCTION

As is true throughout the Orient, fish is one of the main sources of animal protein for the people of the Republic of the Philippines; and since most Filipinos eat fish instead of meat strictly as a matter of preference, the fisheries play an important role in the economy of the country. An estimate of the fishery production before and after the last war is shown in Table 1, while the imports and exports are shown in Table 2.

Table 1 - Estimated Production of Fishery Products^{1/}

Item	11 Months	12 Months	12 Months
	1947	1946	1940
	lbs.	lbs.	lbs.
Production from:			
Commercial outfits	84,727,618	34,985,196	251,988,660
Fish ponds	45,734,920	35,420,000	44,732,600
Municipal and sustenance fisheries..	260,925,078	38,638,600	77,278,740
Totals	391,387,616	109,043,796	374,000,000

^{1/} From Second Special Report, FAO, Philippine Committee, Manila, January 1948.

Recent information from the Philippine Bureau of Fisheries indicates that the 1947 fish catch by commercial fishermen amounted to 84,727,618 pounds. There was quite a vigorous upward trend in the increase of commercial fishing during 1947. It is evident that progress is being made in the rehabilitation of the fisheries, but considerable work still needs to be done to get the yield back to the prewar total.



FIG. 1 - NATIVES START DAY WITH A FISHING EXCURSION INTO THE SURF USING A BEACH SEINE

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Formerly, the bulk of the commercial catch brought into the large city markets was taken by Japanese boats having a Japanese master fisherman and engineer,

Table 2 - Estimated Imports and Exports of Fishery Products^{1/}

Item	1946	1940
	lbs.	lbs.
Imports	46,812,618	24,422,671
Exports	5,119,624 ^{2/}	2,066,541

^{1/} Special Report, FAO, Philippine Committee, Manila, August 1947.

^{2/} Only 629,690 pounds are edible fishery products.

a Filipino licensed skipper or "patron" and a Filipino crew. The return of Japanese nationals to their homeland at the close of the war, therefore, provided an opportunity for new interests to get into the fishing industry, as is shown by the increase of licensed commercial fishing boats in Table 3. Also, the influx

Table 3 - Licensed Commercial Fishing Boats over Three Gross Tons^{1/}

Item	1947	1946	1945	Prewar
Powered	191	117	40	- ^{2/}
Non-powered	291	227	12	- ^{2/}
Total	482	344	52	334

^{1/} From Second Special Report, FAO, Philippine Committee, Manila, January 1948.

^{2/} Data not available.

of fishing supplies, principally net twines and fish nets, promoted the brisk resumption of many fishing activities--both commercial and subsistence fishing.

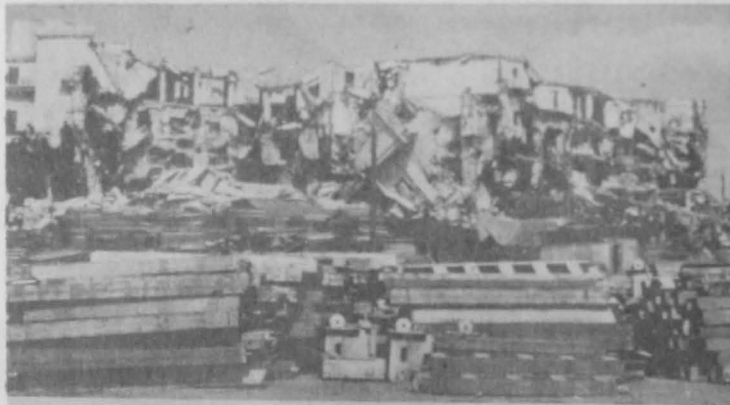


FIG. 2 - WAR DAMAGE IN MANILA. NEW BRIDGE STEEL IN FOREGROUND.

The high postwar price of fish was an added incentive, the average fresh fish price in 1946 being 58 cents a pound; and in 1947, 44 cents a pound as compared to a prewar average of 7 cents a pound. Many people with money to invest, but without previous fishing experience, bought equipment and hired crews to go after fish. The venture was profitable for many of the operators, particularly immediately after the war. However, the increase in the production of fishery products resulted in a decrease

in value, and lately, the decrease in the price of fish has caused owners of fishing vessels who were only after a quick profit to get out of the business. In addition, the tendency of some crews to sell their catch "sub-rosa" has been another discouraging factor. This practice is liable to occur if the boat is fishing some distance away from the home port and the owner does not sail with the ship or otherwise have close control of the operation.

FISHING METHODS

Only a brief summary of the more important methods of catching fish will be presented in order to give a background to the discussion on marketing and process-

ing. It is planned to publish a detailed description of gear and fishing methods later.

The beam trawl, or utase, introduced by the Japanese is the chief method used for catching bottom fishes. The utase differs from the otter trawl in one major respect; a beam is used instead of doors to hold the mouth of the net open. This gear is employed extensively in Manila Bay, Lingayen Gulf, and off the coasts of western Negros, southwest of Bacolod, and off Samar and Panay Islands. Ragay Gulf is also a good trawling ground, but is not being fished much at the present time. The trawling grounds are limited, due to the restricted area of grounds within the 100-fathom curve, the presence of coral in some places, debris washed down rivers during flash floods in others, and war wreckage in still others.

A catch of 400 pounds of mixed fish for a drag of four hours with a beam trawl is considered a good haul, a typical breakdown of the percentage by weights of the types of fish taken being as follows:

<u>Name</u>	<u>%</u>	<u>Remarks</u>
Sap-sap	50	Slipmouths and other small fish.
Halo-halo	20	Miscellaneous medium sized fish, 8 to 12 inches long.
Kalaso	3	Lizard fish. They are not considered worth icing so are salted and brought back as deck cargo.
Joya	20	Miscellaneous big fish such as groupers, sea bass, and snappers.
Shrimp & squid	7-15	

The highest price is received for shrimp and squid, joya being the next in value, halo-halo next, and kalaso and sap-sap the least valuable.

The majority of fishermen work on a salary basis, although there are reports of isolated cases where the crew gets shares or a bonus. The captain, engineer, and chief fishermen receive in the neighborhood of \$6.00 a day while the balance of the crew received \$3.50 a day, with a cut to half pay when the ship is not fishing.

All fish caught on beam trawlers are iced and the better types of ships have insulated holds to aid in preserving the catch on long hauls.

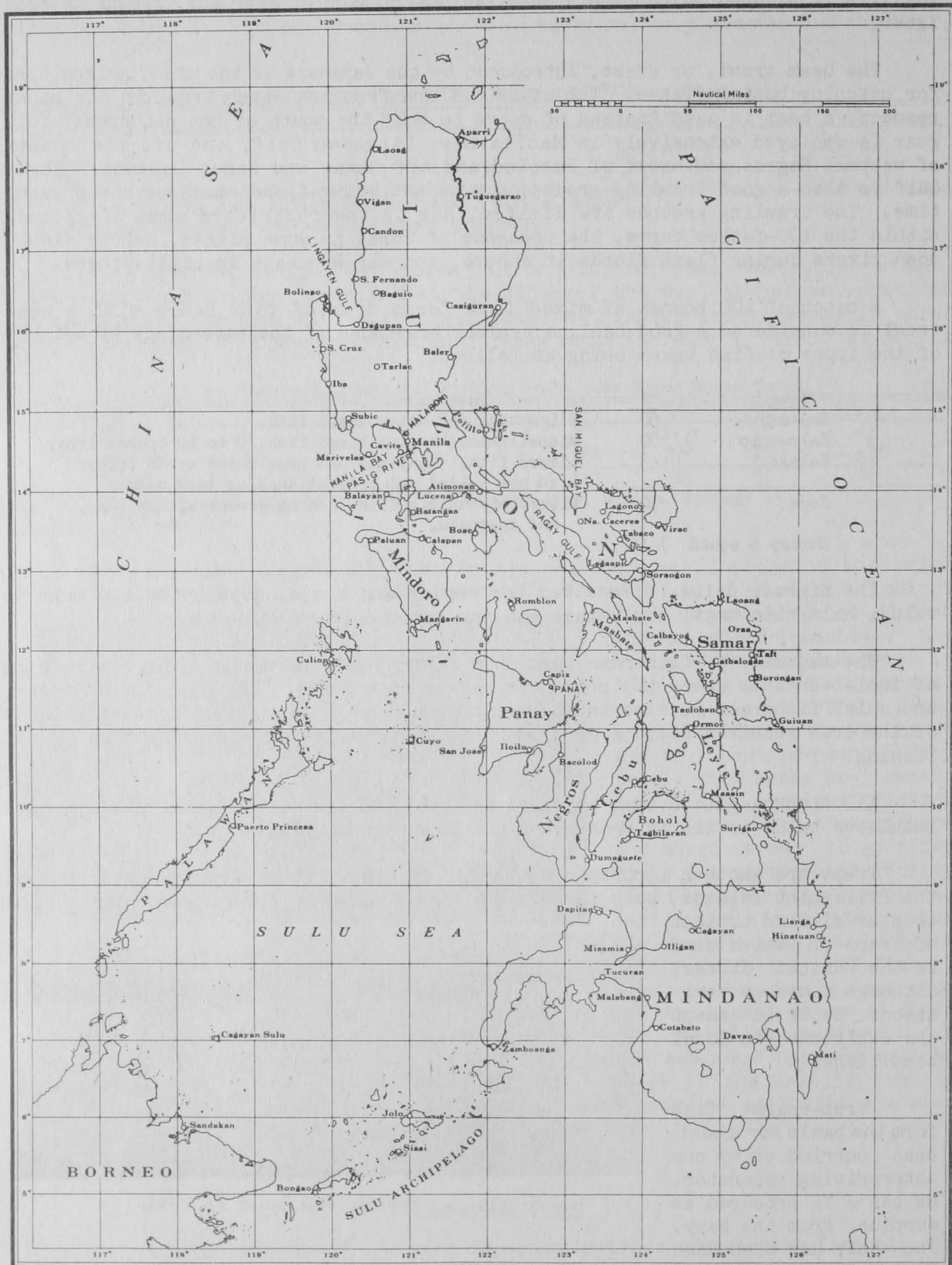
Traps are another important method of fishing. These are found throughout the Philippine Islands, both in salt and fresh water. The general plan of the trap is similar to that of traps or weirs used in the United States, although numerous variations occur to adapt the equipment to local conditions.

Trap-caught fish form the basis for a business carried on by one enterprising operator. He has a YP procured as surplus from the Navy. The ship had been used



FIG. 3 - TYPICAL PHILIPPINE FISH TRAP

during the war to carry frozen and refrigerated provisions so it has ample freezing space, both for dry storage or for brine freezing, as desired. The owner



Philippine Islands

takes the ship to the southern Islands where traps are visited and any marketable catch bought and immediately frozen. As soon as a large enough pay load is obtained, the ship heads back to Manila. The capacity of the carrier is 100 tons but the fare brought in ordinarily amounts from 40 to 50 tons. In 1947, the owner reported a take of 500 tons, of which 350 tons were tuna or tuna-like fish.

Anchovies and other small fish are taken by a night light used in conjunction with sapiao nets (a round haul seine made of cotton twine). Basnigs nets used with lights are also employed to catch anchovies in Visayan Sea, the Batangas area, and Manila Bay.

In addition, just about every type of gear used by fishermen in other parts of the world will be found here, including handlines, cast nets, gill nets, beach seines, purse seines, and others.

A large percentage of the fish taken in the Philippines is obtained by dynamiting. To supply the Manila markets, PT boats are used as fish carriers, their

source of fish being the fishing grounds off the northern tip of Palawan, located just south of Luzon. Dynamite is also used extensively for taking reef fish in the Sulu Sea. It is regrettable that such a method is used, but it also must be admitted that the procedure is an important factor in supplying food fish for the people. However, with the cooperation of other Government offices, the Bureau of Fisheries field men in 1947 waged a campaign against illegal fishing, particularly that done with the use of dynamite. But the lack of facilities hampers this work greatly.



FIG. 4 - FISHERMAN CASTING HIS NET

MARKETING FRESH FISH

As a preface to a discussion of marketing, one peculiarity of the Philippine buyer should be pointed out. Filipinos, particularly in Manila, prefer buying their fish in the round because it is considered that the quality of the fish may be more readily determined when it is in that form. Unless a large fish is to be cut up and sold by the piece, all fish are therefore sold without eviscerating. Another factor to be considered is that fresh fish are far more acceptable than the frozen product, although the people are becoming more accustomed to the latter in the large markets.

Fresh-water fish sold on the Manila market are brought directly to the retail selling place by vendors who go out to the fishing grounds or by the fishermen themselves. Fish handled in this fashion are the murrel, catfish, mullet, carp, guramy, and climbing perch, a large part of which are caught in Laguna de Bay, a fresh-water lake several miles east of Manila.

Most of the marine fish are taken to landing centers and sold wholesale to the dealers who then take them to market places for resale. There were several such landing places before the war, but, at present, the only ones of any size in the Manila area are Navotas and the Royal Ice Plant.

The Navotas landing is located about 8 miles by road north of the center of Manila. The market consists of a series of sheds 200 yards in length built just above the high water mark on the beach. The sheds are open on the side facing the sea. Beam trawlers bringing in a catch anchor offshore and the catch is ferried ashore by a DUKW (an amphibious vehicle obtained from Army surplus). The beach here is long and gradual so that the DUKW is an ideal vehicle for servicing the fishing boats. The service charge is \$6.00 per boat. The DUKWs have been used now for over a year, but will probably be eventually replaced by the large native dug-outs called "bancas" which were formerly used for the servicing work.



FIG. 5 - TYPICAL RICE PADDY FISHERMAN

The sale of fish starts at about 3:00 a.m. so that the product is in the retail market and usually sold to the consumer before the sun is high.

Another important wholesale fish market is Malabon, a mile or so from Navotas. At this point, the pond-raised bangos are brought into the market in "bancas" from the ponds around Manila Bay.

The product carried to the Royal Ice Plant consists primarily of reef fish brought up from Palawan, some beam-trawl caught fish and occasionally frozen fish, brought in by the YP to which previous reference has been made. Being located on the Pasig River right in the center of Manila--it is in a strategic position for selling fish. Much of the catch brought in here is held in frozen storage.

Fish are also brought to the Manila market by train from San Miguel Bay and Ragay Gulf, by truck from localities connected by good roads such as Batangas, and a considerable quantity is flown in by commercial airlines.

There are several large markets in Manila--Divisoria, Quiapo, Obrero, Bambang, Paco, Arranque, and Tondo, being the most important. Divisoria is the largest market and here the fish counters have a tile facing and a generally clean appearance.

Paco was reported to be a model of its kind before the war, with running water to all stalls, adequate drainage, and other modern features, but, as is true of most of the markets here now, much repair work will be necessary to bring it up to a good sanitary condition.

As was pointed out previously, most of the fish are sold in the round, and in some cases, particularly in that of the "dalag" (a murrel) the fish is still alive at the time of sale. In fact, the dealer keeps a club handy with which to hit the particular "dalag" which the customer buys to keep the fish from jumping out of the market basket. Some of the larger fish such as barracuda, Spanish mackerel, and tuna, are steaked and one small type, the lizard fish, is filleted. This is the only instance that has been noted where filleting is practiced in the Philippines.



PHILIPPINE LIZARD FISH

In the market places of the other cities in the Philippines, the fish markets are more or less like those in Manila, depending on the condition in which the ravages of the war left them. In Jolo, for example, some of the fish are displayed on the ground with only a banana leaf to keep the product from the pavement, and in some cases, the fish may be placed on the bare ground. The tables on which fish are cut up to be sold by the piece are often in an unsanitary condition, being covered with dried blood and scales. Lack of running water in the markets is one of the chief drawbacks to cleanliness, particularly in the provincial barrios.

PROCESSED PRODUCTS

Salted and Dried Fish

Salted and dried fish comprise the chief processed products now being prepared in the Philippines. For the most part, the industry is located in the central and southern part of the Republic. The Gigantes Islands, two small islands off the northeastern tip of Panay, are now the chief salting centers but, just as the industry moved from Estancia to Gigantes, shortly before the war, so now there is taking place a shift of some of the salteries from Gigantes to more southern regions, Zamboanga being one of the favored localities. The 18 salteries on the Gigantes Islands are reported to have produced over 2,000,000 pounds of salted fish during 1946, which sold for an average of 27 cents a pound.

Table 4 - Quantity and Value of Salted, Dried, and Smoked Fish Handled in Manila Markets in 1947^{1/}

Item	Weight lbs.	Value
Kench Cured (Balbakua)	174,600	\$ 70,050
Fish Paste (Bagoong)	6,031,000	815,040
Dried Split (Daing)	3,966,200	1,703,509
Dried Round (Tuyo)	8,544,200	3,147,760
Smoked Fish (Tinapa)	2,611,300	1,430,313

^{1/} Data obtained from Philippines Bureau of Fisheries.

Sitankai, one of the southernmost islands of the Philippines, is also an important salt fish producing place. The fish processed there are sold in Davao, Jolo, Zamboanga, and Cebu, as well as being shipped to Manila.

Figures are not available on the total quantity of processed fish produced in the Philippines, but Table 4, showing the products handled in the Manila markets during 1947, will give an indication of the relative importance of the different salted, dried, and smoked items.

Bagoong

One of the most important salted products is "bagoong," a type of fish paste. It is an important flavoring material widely used in the preparation of vegetable dishes. Some people often partake of meals consisting of rice, vegetables, and bagoong, the latter serving as the sauce which makes the vegetables more palatable.

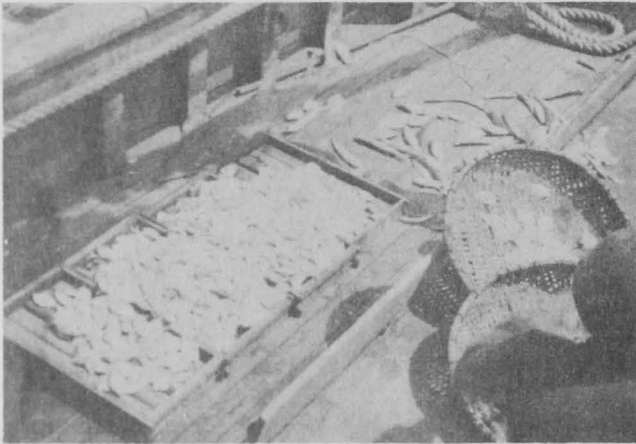


FIG. 6 - VIEW ABOARD A MANILA BAY TRAWLER SHOWING THE TRAYS ON WHICH THE FISH ARE HANDLED.

Bagoong is one of the few Philippine fishery products now exported, and quite a sizable amount is shipped to Hawaii for the Filipinos living there.

There are many different grades of bagoong, the better types being produced from goby and herring fry, anchovies, small sardines, and tiny shrimp, and the less desirable from slipmouths and other fish which do not have a ready sale on the fresh fish markets. In one locality, it was found that fish viscera were used for the manufacture of bagoong, and in another region bonito livers are considered to make the best product.

A typical procedure is to mix one part of salt to two parts of fish by weight. The ratio of salt to fish is only approximate since the manufacturer, in many instances, does not measure the quantities of either component, but judges by the appearance of the product the amount that is considered necessary. The salt and fish are thoroughly mixed together, either on mats, in wooden vats, or in worn-out "bancas" (native dugout canoes). The mixture is then transferred to a container for fermentation—50-gallon oil drums being used in some cases, concrete vats in others. In some instances, the fish are ground in a food chopper before mixing with the salt.

Fermentation proceeds for one to three days in the vat after which the mixture is transferred to 5-gallon square metal cans. Unless the vats and cans are covered with screening during the fermentation, flies will deposit eggs which develop into maggots during the process. After standing in the cans for a week, most of the gas from the fermentation has escaped, and a piece of tinsplate is soldered over the circular opening in the top of the can and the product is ready for shipment.

Salt Fish

Small fish are cured in the round. After washing in sea water, they are placed in concrete brining tanks containing a strong brine solution which, in some cases, is saturated, but more often is of an indeterminate salt content. If the brine is considered to be weak, additional salt is sprinkled over the surface of the fish and they are left in the solution for from three to five hours. Then they are washed in sea water, placed on split bamboo matting trays which are elevated on bamboo rods set about three feet off the ground to be dried. The fish are occasionally turned on the mats to insure uniform drying. The drying racks are sometimes situated over the water in order to eliminate flies and to get better conditions for rapid drying.

Medium fish are split along the back, eviscerated and laid open, before salting and drying. Large fish are split three times so that the backbone forms one section and the two sides the other sections. The fish can thus be laid out flat for drying. Diagonal cuts are also made in the sides of the thicker pieces to facilitate penetration of the salt.

Salt fish produced in the salteries on the Gigantes Islands, largest center of the industry, are packed in 55-pound boxes made from Philippine mahogany, which cost the processor about 75 cents each. No liners are used and, during the rainy season, mold is often present on the fish by the time it reaches the large markets from the point of production. In Manila, the molded fish are washed and redried to remove the mold before it goes to the retailer.

Still another salt product is made from mackerel and sardines about six inches long. The fish are put in a concentrated brine solution for 12 hours, after which they are allowed to drain overnight. The following morning, they are salted with coarse dry salt and marketed with crystals of salt surrounding them. This is the product referred to as "kench-cured" or "balbakua" in Table 4.

Small anchovies, two to three inches long, are dried without salting when weather conditions permit. Elimination of salt is claimed to result in a product with a longer keeping period—the salt having a tendency to take up moisture.

In the Sulu Archipelago, large snappers and similar fish are cut to lay out flat and then cut through so that the finished product has a net-like appearance. These fish are dried aboard the small fishing boats as they are caught, being occasionally dipped in sea water during the process of drying.

Shrimp paste is another important product, it being particularly popular in the Visayan Islands, just south of Luzon. A typical method of preparation is to mix small shrimp with salt in the proportion of five parts of shrimp to four parts of salt, after which the shrimp is put in bags and pressed with heavy weights until brine no longer drains freely. The shrimp paste is spread out on mats in the sun until partially dry, then put in a wooden trough and mixed with two or more parts of salt (based on the original weight of shrimp). The mixture is trod upon by workers until thoroughly macerated, after which it is ready for packaging.



FIG. 7 - BASKETS CONTAINING ICED FISH READY TO BE SHIPPED FROM BATANGAS TO MANILA BY TRUCK.

A substitute shrimp paste was seen in the Manila market made from ground salted fish and macerated cooked beans mixed in equal proportions by weight. The product was artificially colored to have the pink appearance of a good shrimp paste.

Patis

Patis, a clear, straw colored liquid, should also be classed as a salt fish product. The better grades are prepared from anchovies, goby fry, small shrimp, or gizzard shad which, after washing, are mixed with salt in approximately the same

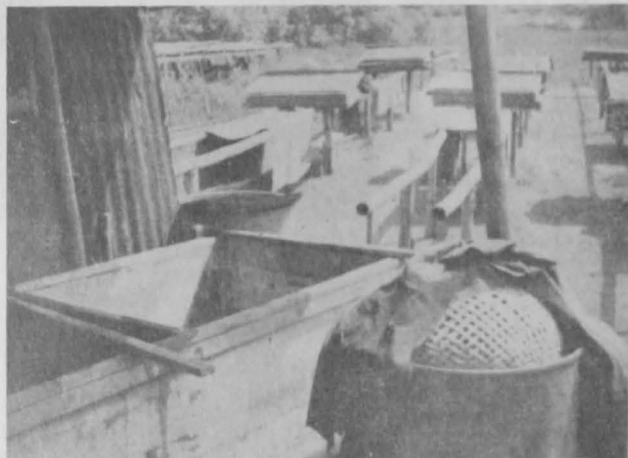


FIG. 8 - FISH DRYING YARD, NAVOTAS, SHOWING DRYING RACKS IN REAR, FISH BRINING TANK IN LEFT FOREGROUND, AND 50-GALLON OIL DRUM CONTAINING FISH PASTE IN RIGHT FOREGROUND.

proportion as for the manufacture of bagoong, namely, one part by weight of salt to two or three parts of fish. The components are mixed and placed in large wooden cylindrical vats, concrete tanks, or earthenware jars. The mixture is allowed to ferment for six to eight months. The liquid is then allowed to drip from a spigot placed near the bottom of the vat. It is collected, aged in the sun, or brought to a boil and cooled for a few minutes, bottled in 12-ounce soft drink bottles, stoppered with a cork, labeled, and shipped to the market. The residue after draining off the liquid is again mixed with salt and after standing, results in a second grade product. This process may then be repeated two more times before the solids are discarded.

The protein content of patis as determined in the Program Laboratory was found to be 9.5 percent for the first grade; 8.5 percent for the second; 3.5 percent for the third; and 0.3 percent for the fourth. The salt content of four samples determined as chloride and calculated as sodium chloride was found to be from 29 to 34 grams per 100 milliliters which would indicate that the patis is practically a saturated solution of salt.

Filipinos cook their rice without salt and the patis, therefore, serves not only as a condiment but as a source of salt. A high grade patis would also contribute some protein or protein breakdown products to the diet.

Smoked Fish

The only smoked product marketed in any quantity in the Philippines is called "tinapa." Mullet, gizzard shad, sardines, five to six inches in length, are washed but not eviscerated, put in a concentrated brine for one-half hour, then cooked in a saturated brine solution until the eyes fall out--usually about five minutes.

The fish are then drained and spread in the sun to dry, after which they are neatly arranged in rows on circular trays 16 inches in diameter which hold 100 fish. The smoking chambers consist of large earthenware jars or concrete furnaces

three feet deep. From 5 to 40 of these chambers are found in each factory. Glowing charcoal is placed in the bottom of the jar and hardwood sawdust is sprinkled over the charcoal to provide the smoke. Two trays of fish are put over each opening and their position changed from top to bottom once during the process. At the plant visited, the fish were smoked for $1\frac{1}{2}$ hours, but it is reported that in some cases, the smoking may be for as long as 10 hours, the latter being used for fish to be held a longer period of time.

In the Manila area, the smoked fish are taken to market in the trays in which they were smoked. They are ordinarily sold within 24 hours after smoking and the baskets returned to the processor. The producer gets \$1.75 a hundred for the fish and they retail at \$2.25 or more a hundred.

CANNING

Prior to the war, the major fish-canning operation in the Philippines consisted of a tuna canning plant in Zamboanga on Mindanao Island; a plant for the canning of bangos in Capiz on Panay Island which was just completed in 1941; a pilot plant operated by the Bureau of Fisheries at Estancia on Panay; and a factory at Madrideojos in Cebu which canned sardine, mackerel, and bonito.

All these plants were destroyed during the war and it is not known when their reconstruction will be accomplished, if at all. The laboratory canning plant operated by the Program and a similar one by the Philippine Institute of Fishery Technology are, therefore, the only places where studies on canning of fish are now being conducted. The National Development Company, a government-sponsored operation, has equipment for a cannery in storage, but is waiting until the price of fish is reduced before installing it for production.

A large pineapple cannery, a branch of a California packing corporation, at Bugo on Mindanao Island, would be in a position to pack fish if a large enough supply were found to justify such expansion.

A note of encouragement for the canning industry is a recent item in a Manila newspaper to the effect that one of the large United States can manufacturing companies is planning to establish two can factories in the Philippines; one to service the Philippine Packing Corporation and another in the vicinity of Manila. A can company representative pointed out, that on the basis of present United States prices, paint cans could be supplied in Manila for one-fourth the price that is now being charged. Presumably, the price on food cans could be correspondingly decreased and would be an incentive to the development of canned fishery products.

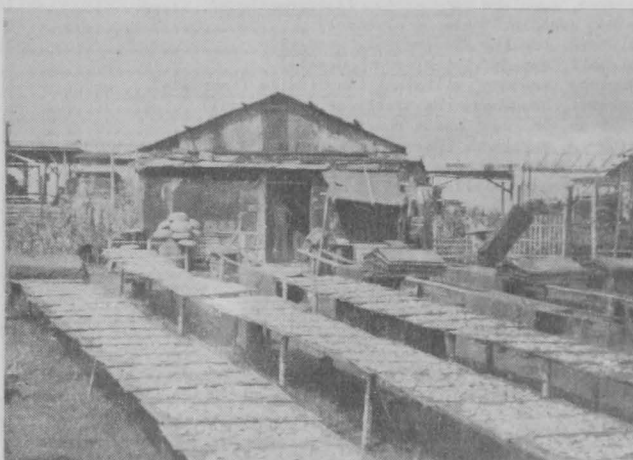


FIG. 9 - VIEW OF FISH DRYING AT NAVOTAS SHOWING THE FISH SPREAD OUT ON TRAYS.

FILIPINO DIET

The diet of the common Filipino laborer is unbalanced. He eats too much rice and not enough meat, fish, fruit, and vegetables. Tables 5 and 6 show the nutritive

Table 5 - Nutritive Value of Philippine Fishery Products^{1/}

Item	Number of Analyses	Edible Portion	Proteins	Fats	Carbo-hydrates (N.F.E.)	Fuel Value per kilogram ^{2/}
		percent	percent	percent	percent	calories
Anchovy, dilis (<i>Stolephorus commersonii</i>)	2	72.36	16.91	0.74	0.39	760
Anchovy, dilis, dry	2	-	63.33	1.63	0.98	2720
Asohos (<i>Sillago sihama</i>)	1	47.35	18.59	5.67	0.66	1280
Catfish, hito (<i>Clarias batrachus</i>)	1	56.51	17.66	4.75	0.09	1140
Catfish, kandule (<i>Arius manillensis</i>)	2	47.03	17.38	0.81	0.46	790
Catfish, kandule, mature	1	-	16.45	-	-	-
Cavalla, talakitok (<i>Caranx armatus</i>)	2	51.64	19.97	3.46	-	1110
Caesio, dalagang bukid (<i>Caesio chryzonus</i>)	2	58.97	20.20	1.78	-	970
Caesio, dalagang bukid, (<i>Caesio caeruleus</i>) blacktail, dry..	1	-	66.50	8.65	0.06	3440
Climbing perch, marteniko (<i>Anabas testudineus</i>)	1	44.56	18.56	5.11	-	1200
Eel, swamp, palos (<i>Synbranchus bengalensis</i>)	1	50.59	17.78	0.54	-	760
Flat head, sunog (<i>Platycephalus indicus</i>)	2	49.23	19.72	0.99	-	880
Flounder, dapa (<i>Pseudorhombus olipodon</i>)	1	52.00	19.98	0.97	1.08	930
Gizzard shad, kabasi (<i>Anodontostoma chacunda</i>)	2	51.94	19.68	3.00	0.19	1070
Goby, bia (<i>Glossogobius giuris</i>)	2	49.51	17.69	1.45	0.01	840
Grouper, lapulapu (<i>Amyperodon leucogrammicus</i>)	1	-	20.22	0.69	1.04	910
Grunt, ayungin (<i>Therapon plumbeus</i>)	2	42.93	18.64	0.82	-	820
Halfbeak, buguing (<i>Hemiramphus georgii</i>)	1	60.44	20.56	1.24	-	990
Hairtail, espada (<i>Trichurus haumeala</i>)	1	-	33.69	4.26	0.54	1750
Herring, immature, silinasi (<i>Sardinella fimbriata</i>)	1	-	19.13	2.63	0.22	1010
Mackerel, hasa-hasa (<i>Rastrelliger brachyomus</i>)	1	53.29	22.83	1.95	0.32	1100
Milkfish, bangos (<i>Chanos chanos</i>)	2	69.08	20.32	4.52	-	1220
Majarras, malakapas (<i>Gerres filamentosus</i>)	1	41.49	21.01	2.02	0.18	1030
Mudfish, dalag (<i>Ophicephalus striatus</i>)	1	85.00	16.95	0.48	1.48	780
Millet, young, talilong (<i>Mugil melinopterus</i>)	1	30.00	20.15	2.65	-	1090
Forgy, bakoko (<i>Sparus berda</i>)	2	49.48	20.42	1.27	0.34	950
Sardine, tamban (<i>Sardinella longiceps</i>)	2	45.99	19.17	2.66	-	1010
Sea bass, apahap (<i>Lates calcarifer</i>)	2	56.28	20.35	1.81	0.51	1000
Slipmouth, sapsap (<i>Leiognathus equulus</i>)	1	41.80	19.23	0.54	-	820
Snapper, red, mayasaya (<i>Lutjanus malabaricus</i>)	1	-	18.14	7.42	0.54	1420
Spade fish, kitang (<i>Scatophagus argus</i>)	2	42.76	17.85	4.44	1.28	1170
Spanish mackerel, tanginai (<i>Cybius commerson</i>)	1	-	20.36	2.67	-	1060
Surgeon fish, labahita (<i>Acanthurus bleekeri</i>)	1	76.05	19.19	3.75	1.34	1160
Tarpon, buan-buan (<i>Megalops cyprinoides</i>)	1	50.00	18.96	4.19	-	1140
Therapon, bagoang (<i>Therapon jarbua</i>)	1	50.00	19.72	2.48	-	1010
Tuna, tulinigan (<i>Euthynnus yai</i>)	1	55.93	23.91	1.77	0.19	1120
Salted, dried, and smoked fishes:						
Herring, tinapa, tunsuy (<i>Sardinella fimbriata</i>)	3	-	40.60	2.80	0.47	1900
Herring, tuyo, tunsuy	2	-	41.36	3.92	0.98	2090
Milkfish, bangos	1	-	30.29	3.84	-	1560
Slipmouth, sapsap	1	-	45.64	2.46	-	2050
Millet, young, talilong	1	-	37.44	6.24	-	2060
Fish and crustacean byproducts:						
Bagoang alamang	1	-	10.38	1.15	0.71	550
Bagoang Ilocano	1	-	12.94	0.98	0.68	630
Bagoang Visaya	1	-	17.88	0.43	1.67	820
Patis Cavite:						
First class	1	-	6.69	0.57	0.44	340
Second class	1	-	2.52	0.29	1.04	170
Third class	1	-	2.67	0.71	1.22	220

^{1/} From A Handbook of Philippine Agriculture, College of Agriculture, University of the Philippines, 1939.

^{2/} Kilogram = 2.2 pounds.

value of Philippine fish and fishery products and the mineral content. Since fish is a good source of proteins, the development of the fisheries is very important to the people of the Republic of the Philippines.

COMMENTS

Observations of the Philippine fisheries for a period of nine months has led to the following conclusions as to current conditions and efforts that should be made to improve them.

With regard to the catch of fish for the fresh market, intensive fishing efforts are made in some areas, while other areas, with a large potential supply

of fish, are relatively unexploited. For example, the comparatively restricted Manila Bay grounds are heavily fished by beam trawlers, whereas, in the more productive southern areas, small sailing craft with hand lines comprise the major part of the fishing fleet.

Table 6 - Minerals Found in Philippine Fishery Products^{1/}

Item	Calcium	Phosphorus	Iron
	percent	percent	percent
Anchovies, dilis (<i>stolephorus</i> sp.), dried	2.866	2.568	-
Bagoong alamang, Cavite Zamboanga	0.457	0.262	-
Bagoong dilis, salted and fermented anchovies (<i>stolephorus</i> sp.):			
Cavite	0.136	0.118	-
Iloco	0.064	0.349	-
Bagoong itlog ng bangos, salted and fermented eggs of milkfish (<i>Chanos chanos</i>)	0.036	0.445	-
Bass, apahap (<i>Lates calcarifer</i>)	-	-	0.0003
Brill (<i>Pseudorhombus</i> sp.)	0.020	0.200	0.0010
Catfish, kandule (<i>Arius</i> sp.)	-	-	0.0004
Clams, average	0.314	0.162	-
Bototoy	0.114	0.179	-
Hala-an	0.407	0.247	-
Luna, brown	0.422	0.118	-
white	0.400	0.170	-
Lucan	0.450	0.100	-
Dry-salted grunt, daing ayungin (<i>Therapon plumbeus</i>)	4.423	2.419	-
mudfish, dalag (<i>Ophicephalus striatus</i>)	1.043	0.943	-
catfish, kandule (<i>Arius</i> sp.)	0.300	0.782	-
Gizzard shad, cabase (<i>Anodontostoma chacunda</i>)	-	-	0.0005
Herring, siliniasi (<i>Sardinella fimbriata</i>)	-	-	0.0006
salted and smoked, tinapa	2.140	0.363	-
Heko, solid residue from the manufacture of "batis"	0.143	0.747	-
Hibe, shrimp (<i>Penaeus</i> sp.), dried and with skin removed	0.033	0.489	-
Lobster	0.018	0.188	0.0009
Milkfish, bangos (<i>Chanos chanos</i>)	0.026	-	-
Mudfish, dalag (<i>Ophicephalus striatus</i>)	0.019	-	-
Mullet, average	0.114	0.268	-
salib	0.127	0.086	-
talilong	0.100	0.450	-
Oyster	0.052	0.155	0.0045
Paltat, hito (<i>Clarias batrachus</i>)	0.009	-	-
Patis alamang, Cavite	0.014	0.009	-
Perch, alalo (<i>Anabas testudineus</i>)	0.013	-	0.0005
Red snapper, mayamaya (<i>Lutjanus malabaricus</i>)	-	-	0.0004
Sardine, tamban (<i>Sardinella longiceps</i>):			
salted and sun dried, tuyo	0.058	-	-
smoked, tinapa	0.063	-	-
Slipmouth, sapsap (<i>Leiognathus equulus</i>)	0.060	-	-
Shrimp (<i>Penaeus</i> sp.)	0.096	0.292	0.0027
salted, maalat	2.337	0.009	-
Spanish mackerel, tañguingui (<i>Cyprinus commerson</i>)	-	-	0.0008
Tulla	0.114	0.162	-
Turbot, dapa (<i>Psettodes erumei</i>)	-	-	0.0007
Tuna, tulinagan (<i>Euthynnus taito nouye</i>)	0.030	0.300	0.0015

^{1/} From A Handbook of Philippine Agriculture, College of Agriculture, University of the Philippines, 1939.

These fishermen in the southern regions have sufficient gear to catch many more fish than are now being taken, but lack of a market in the more remote regions of the Islands discourages more intensive fishing. One of the solutions to the better utilization of this possible source appears to be an operation such as is being carried on by the YP "reefer" ship described previously. Strategic location of freezing storage plants in places having good fish supply is a possible method of working with refrigerated carriers and is practiced by the owner of the YP. Use of small multi-purpose fishing boats of about 50 feet in length with adequate refrigeration or icing facilities would also aid in making better use of the fishery resources in remote regions. Plans are under way to get a ship of this type for use by the Philippines' Fishery Program and a study of its operation should provide important information relative to a more equitable use of fish supply.

In the absence of adequate means of distributing fresh fish, salting and drying of the catch must be resorted to in order to preserve the catch for delivery to distant markets. The salting and drying procedures used are crude, and,



FIG. 10 - PRODUCTION OF SALT BY THE SOLAR EVAPORATION PROCESS.

according to the United States standards, are, in many instances, unsanitary. The salt used is produced in the Philippines, for the most part by the solar evaporation process, and has a higher calcium and magnesium content than that produced by the solar process in California. One of the projects of the Technological Section is to determine if it is feasible to produce a purer salt by slightly modifying the procedure now in use. It is believed that the quality of the salted products could thereby be improved.

Brine salting of fish has been considered as a process that would keep fish in better condition than dry salting as now practiced. Investigation showed, however, that brine salted fish shipped here shortly after the war was not well received, the objection being that the soaking before use to decrease the salt content was an extra preparatory procedure that was not liked by the Filipino housewife.

The contribution the Philippine Fishery Program can make to the salt fish industry will be extension work to (1) improve the methods of salting and drying, particularly with respect to sanitation, and (2) to devise means of getting the product to the market in better condition through improved packaging and transportation. The Philippines' Bureau of Fisheries had started such a program prior to the war and found the people interested in demonstrations aimed to improve the quality of the product and production efficiency.

It is anticipated that canning of fishery products on a commercial scale will not start for at least a year or until the price of fish is substantially reduced and a reasonably priced supply of cans is available. However, the Technological Section personnel have been canning the types of fish considered as possibilities for a practical operation. Data on the use of different oils, sauces, and brines are being obtained so that information will be available for interested parties. Samples from all lots are being held for storage studies.

The fish oil and reduction business is practically non-existent in the Philippines at present. Reduction of fish meals and oils is precluded by high value of fish for the fresh market, by the lack of processing plants, and by difficulty in obtaining waste for reduction purposes. There is a large potential demand for fish meal and studies are to be made on the various species which might be available for reduction.

There have been attempts to start a fish liver buying business in the Islands, but the high price of market fish and the scattered sources of supply have pre-

vented any profitable operation to date. The possibility of exploiting the shark industry is currently being investigated. One of the Program boats is surveying the shark fishing potentialities of the Sulu Archipelago area, which is reported to be one of the good localities. Determinations of vitamin A potency and oil content of the livers of sharks will be made and studies will also be conducted on the value of the byproducts, including the skins, fins for soup, and flesh for food or reduction use. Small sharks are sold in the Manila markets for food, but the Filipinos have an aversion to eating large sharks. However, in the Moro country around Mindanao, large sharks are steaked and sold by the piece with a slice of the liver thrown in, the latter being cooked with the meat to make it more "juicy."

Trepang, or beche de mer, a product consisting of the dried bodies of sea cucumbers (echinoderms of the family Holothuriidae) was formerly an important export article from the Philippines. The principal market was China, but the Chinese placed an embargo on trepang last year, considering it a luxury item. Consequently, the trepang business is at a standstill now. Prior to the embargo, 50 tons a month were shipped out of Jolo to Manila, the price received being between 18 cents to 45 cents a pound, depending upon the quality. No first hand observation of the processing of trepang has been done by Program personnel; however, it is planned that a study will be made with a view to improving the quality of the item in preparation for the time when an export business is once more developed.

No data are available as to the extent of the shellfish industry in the Philippines, but there are numerous edible molluscs found here of which oysters are the most important. The Manila Bay area is one of the potentially important oyster-producing areas, not only because the waters are conducive to growth, but because of the proximity to a large market. Unfortunately, it has been found by the Program bacteriologist that oysters and the overlying waters from two oyster-producing areas, one 10 miles to the north, and one 15 miles to the south of Manila, are polluted. The report on the subject is being submitted to the Philippine Bureau of Fisheries and it is hoped that a satisfactory solution to the problem may be worked out in the future.

Another interesting shellfish which grows on the bottom in some oyster-producing regions is the window shell or "Kapiz" (Placuma placeta Linn). It has two shells about six to eight inches in diameter resembling thin wafers, one shell being almost flat while the other one has a slight curvature. The flatter part of the shell is trimmed $2\frac{1}{2}$ to 3 inches square and each piece is used as a section in the manufacture of windows made up of numerous sections. The shell is also used to make lamp shades and other decorative articles. Meat from the Kapiz is palatable, although the orange color makes it unattractive in appearance.

Mother-of-pearl and trocha shells are important marine products exported in quantity. In 1947, 795,485 pounds of mother-of-pearl and 1,578,150 pounds of trocha worth \$375,020 and \$259,456, respectively, were shipped out of the country.

It can be seen from the foregoing that there is an opportunity for the Philippine Fishery Program, in cooperation with the Philippine Bureau of Fisheries, to render material assistance to the fishing industry. The Filipinos are interested in learning the best methods of doing things and it is up to the personnel in the Program to give them the information and instruction.

An outstanding example of the interest shown is the number of people coming to the Program office in response to a press release about otter trawling. As a

result, one owner has already placed an order for otter trawl gear to put on his new fishing boat. Another man who is converting 5 Coast Guard boats for fishing has been getting data with the intent to install the equipment on his fleet.

Such examples represent concrete cases of a contribution toward rehabilitation and it is the intent of the Program to arouse still more interest in other phases of the fisheries with a view to developing them to the greatest extent commensurate with good conservation.

* * *

Republic of the Philippines^{1/}

Length Equivalents		Area Equivalents	
1 kilometer	= 0.6214 miles	1 hectare	= 2.471 acres
1 pié	= 0.927 feet	3,577,000 brayas cuadradas	= 1 hectare
1 pulgada	= 12 lineas	35,770 loanes	= 1 "
1 "	= 0.927 inches	3,577 balitas	= 1 "
1 varas	= 2.782 feet	0.3577 quiñon	= 1 "
Volume & Capacity Equivalents		Mass Equivalents	
1 ganta	= 8 chupas	1 picul	= 63.25 kilograms
1 "	= 2.71 U.S. quarts	1 arroba	= 25.36 pounds avoirdupois
1 cavan	= 25 gantas	1 quintal	= 46 kilograms
1 "	= 67.75 U. S. quarts	1 "	= 4 arrobas
		1 "	= 0.1 tonne
		1 tonne	= 1.1023 U. S. tons

^{1/} From A Handbook of Philippine Agriculture, College of Agriculture, University of the Philippines, 1939.



SMOKING SHRIMP

Smoking shrimp is a simple process, and the smoked product is so tasty and eye-appealing that an assured demand may be expected in spite of the slightly increased cost.

Long ago, fish and shellfish were smoked principally to preserve them for extended periods of time. As the process of smoking developed and improved, smokers found that fish and shellfish could be smoked lightly for added flavor and color. This discovery was a factor in the development of specialty products--commodities whose qualities are improved or whose value is otherwise enhanced by processing. Thus, in addition to the use of smoking as a means of preservation, its employment has been expanded to add "taste" to fishery products.

--Fishery Leaflet 312