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THE BASNIG, A BAG NET FOR PELAGIC FISHING IN THE PHILIPPINES

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ONE PLATE AND NINE TEXT FIGURES¹

INTRODUCTION

The rôle that labor plays in any fishing enterprise or business cannot be over-emphasized especially in the Philippines where mechanized fishing is not yet well in vogue. Fishing boat operators may fail not only because of poor catches but because of failure in the proper management of labor, or of noncooperation on the part of the fishermen. This is especially true of those engaged in pelagic fishing with such gear as the *talacop*² and *sapiao*,³ the operation of each of which requires no less than 20 and 35 fishermen, respectively.

Usually, fishermen have to be recruited from places other than the operation headquarters. At most, they are not trained fishermen and hence will have to be taught fishing operation. These fishermen-helps have to be provided with food and cash advances for the support of their families. Although these items are either considered a part of the cost of operation or deducted from the respective shares of the fishermen, the cash

¹ Drawn by B. Escuadro, scientific illustrator, Bureau of Fisheries.

² Local name for either ring net or purse seine.

³ A scoop seine operated with five dugouts during the dark phase of the moon and used powerful incandescent lights to attract a school of fish.

needed to provide for the needs of 20 or 35 fishermen required in the operation of a simple outfit would necessarily need a sizeable investment for the capitalist to operate his fishing gear.

In view of the high cost of operation, coupled with the almost unpredictable behaviour of labor, the operation becomes unprofitable. Unless an operator of a sapiao fishing outfit, for instance, is lucky enough to have a well-organized labor-fishermen, he almost always is forced to give up his fishing venture. Fishermen demand cash advances even if fishing fail to bring in production, otherwise they leave the fishing boat even at the height of the fishing season. In the latter case the gear is operated at a greatly reduced personnel and, consequently, at a reduced efficiency. Many other such risks are commonly encountered in the management of some fishing operations with untrained personnel.

These conditions exist in the Visayas and elsewhere where sapiao fishing outfits operate extensively. It is our observation that usually not more than 50 per cent of these outfits could continue to operate during the entire period of the fishing season. As a natural consequence, operators of sapiao have to change to other fishing gear requiring much less number of fishermen. One of such gear is a bag net popularly known as *basnig*.

The wide interest that our fishermen has in this method of fish capture has prompted the authors to present in this paper, among others, the construction and method of operation of the gear and a brief discussion on its possible effect upon our fisheries.

THE FISHING GEAR

The development of the basnig.—Although *basnig* is generally considered endemic, its origin and early development is not definitely known. In fact most fishermen became aware of its existence only when powerful incandescent lamps were used in its operation during the earlier part of 1935. In the absence of records, it is believed that the gear must have originated or evolved from similarly operated simple gear which has long been used in the Visayan waters for subsistence fishing.

The simplest net that is oftentimes referred to as *basnig* by some fishermen from northern Capiz is a lift net used to catch fish that have entered into the terminal crib of a fish corral constructed in deeper waters. This is made of sinamay

cloth sewn together and hung with sufficient slack assuming a trapezoidal or heart-shaped net depending upon the shape of the terminal crib where the gear is used. As the catching of the fish in the crib is usually done at night so as to sell the catch to the fresh-fish market the following morning, a torch or light is used during the operation.

The gear is quite improved in the so-called *bintol* of some fishermen from Bohol and Naval, Leyte, or *basnig* (*balasnig*) of the central Visayas. Although it is also trapezoidal or rectangular in shape, the gear is made of hand-knitted netting from a fine abaca twine and operated under a half-ton gross dug-out by two fishermen. The net is carefully spread at some distance below the boat after which a light is used to concentrate a school of fish over the net. A bundle of dried coconut leaves or split bamboos was first used to produce the light. This was changed later to a rolled cloth soaked in kerosene and placed inside a green bamboo tube. This was again replaced by incandescent lamp of 250 to 300 candle power when *hasag*, *petromax* or *coleman* lamps appeared in the market in 1924.

Bigger-sized dugouts with bigger nets of either coarse sinamay cloth or hand-knitted abaca twine netting are used in Cebu and Negros. In Bohol the gear is operated inside a somewhat rectangular enclosure with corner posts. A pull rope with a sinker is tied to each corner of the net. This is dropped by four fishermen who each sits on each of the posts to catch the fish attracted by incandescent lamp hung at the center of the enclosure. Perhaps because the bigger-sized fishes could escape while the net is being lifted, it was constructed with more slack until it was made to assume its present inverted box form. This type of net is also called *bintol* in northern Leyte; *new look* in Tubigan, Bohol; and *basnig*, or *balasnig*, in Northern Cebu, Negros Island and Iloilo.

The use of three tons gross or more dugouts equipped with a 1,000 to 1,500 candle power incandescent lamp and big *basnig* net was observed for the first time at Punta Buri, Tagubanhan Island, during the early part of 1935. A notable increase in the catch of the gear had attracted the attention of some sapiao operators in the place, who lost no time to convert their sapiao boats into *basnig* boats. With their entrance into the business, these operators extended their activities as far as the Visayan Sea during the southwest monsoon of 1936 where *sapiao* oper-

ators from Samar also fished. This brought the use of the gear to the latter province during the following northeast monsoon.

Through the help and encouragement of the Bureau of Fisheries, then a special division under the Department of Agriculture and Commerce, a Batangas fishermen operated the basnig at Balayan Bay in 1939. From this place it spread to Cavite, Cavite Province, and neighboring towns, then to Navotas and Malabon, Rizal Province; to Lingayen Gulf and waters of northern Luzon.

During this period, the basnig gradually underwent modifications. From a small-sized gear operated on a half ton gross banca manned by four to six men, the net had gradually been made bigger and operated with power-propelled boats of 2 to 10 tons gross by 12 or more men. In 1950 regular draggers and fish carriers were used as basnigan. Because of its comparative effectiveness in proportion to the size of the net, the small number of fishermen needed to operate it, the ease with which it is operated and the small amount of investment needed, the basnigan has become so popular among fishermen that it is now being operated in almost every fishing ground in the Philippines.

Table 1 shows the number of various commercial fishing boats licensed by the Bureau of Fisheries from 1945 to 1951. The figures do not include fishing boats of 3 tons gross or less as they operate under municipal licenses. Considering this fact, it is believed that much more basnig outfits are operating in our waters than what appear in the record of the Bureau of Fisheries.

TABLE 1.—Comparative number of fishing boats licensed by the Bureau of Fisheries from 1945 to 1951

Name of fishing gear	1945	1946	1947	1948	1949	1950	1951
Basnig.....	4	132	96	165	242	333	502
Beam trawl.....	(a)	80	49	85	166	157	131
Beach seine.....	(a)	(a)	9	18	16	16	37
Gill net.....	22	1	(a)	3	5	3	2
Hook and line.....	(a)	2	4	8	2	8	7
Muro-ami.....	(a)	7	8	9	2	2	2
Otter trawl.....	(a)	(a)	10	17	58	129	190
Purse seine.....	(a)	8	6	9	10	16	26
Sapiao.....	9	89	35	50	218	109	107
TOTAL.....	35	319	217	362	719	773	1,004

* No record.

Table 2 shows the comparative landings of the different fishing boats licensed by the Bureau of Fisheries from January

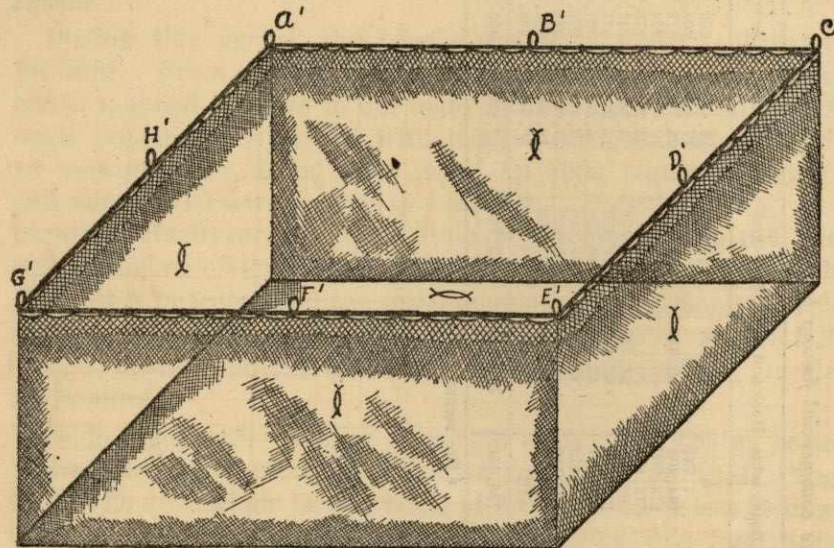
TABLE 2.—Monthly landings (in kilos) of some commercial fishing boats from January 1951 to December 1951.

Months	Basnig	Beam trawl	Beach seine	Hook and line	Muro-Ami	Purse seine	Otter trawl	Sapiao	Total
January.....	1,033,203	1,429,755	(a) 7,731	48,990	18,240	12,420	650,835	786,306	3,979,659
February.....	906,057	1,339,377	(a) 164,208	(a) 32,850	6,810	17,400	806,798	894,443	3,578,816
March.....	1,214,178	1,328,313	173,709	(a) 48,436	15,300	24,750	912,597	456,444	3,934,344
April.....	1,313,952	1,224,240	78,501	(a) 78,501	(a) 48,436	10,650	774,180	240,096	3,685,433
May.....	1,896,507	886,245	96,051	(a) 35,775	(a) 111,875	3,240	775,770	281,951	3,238,759
June.....	2,241,534	1,347,855	111,432	63,600	41,835	3,780	1,241,022	876,176	5,108,541
July.....	1,716,102	1,056,861	56,637	43,995	336,528	5,250	897,357	794,343	5,934,733
August.....	2,680,956	1,339,236	14,412	49,455	36,510	2,439	1,278,453	938,565	4,908,573
September.....	2,998,788	1,983,391	10,410	(a) 53,700	72,300	27,030	1,284,324	557,571	6,340,206
October.....	1,633,947	900,888	13,257	(a) 53,700	(a) 49,452	16,500	751,392	258,276	3,700,269
November.....	1,870,065	1,144,056	(a) 736,348	328,275	393,942	49,452	1,405,776	240,879	4,710,228
Total.....	20,504,271	14,349,462	736,348	328,275	393,942	187,887	11,995,878	6,241,287	55,027,350

* No record.

1, 1951 to December 31, 1951. Basnig boats of more than 3 tons gross landed 20,504,271 kilos of fish representing over 27 per cent of the total weight of fish landed that year. This figure represents only those reported to the Bureau of Fisheries; actual figures should be much bigger.

The net.—A finished net (fig. 1) assumes the position of an inverted mosquito net. Its size depends upon the range of the outriggers of the boat on which deck the net is operated.

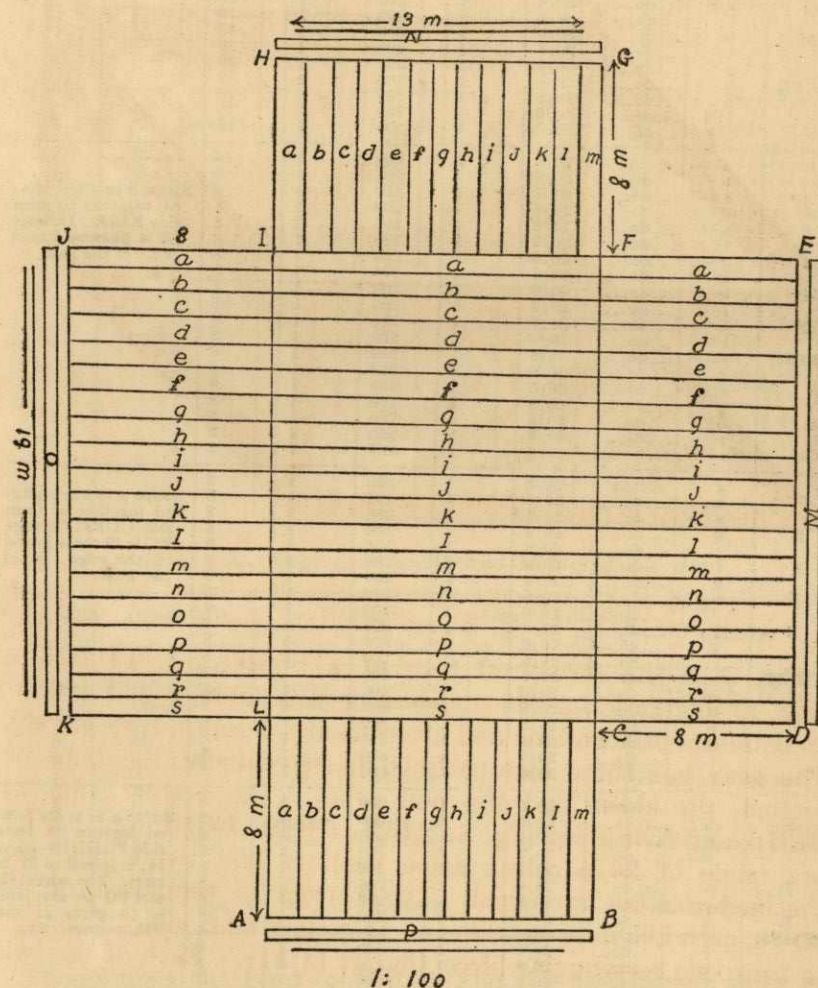


SCALE 1/2 Cm.: 1 m.

FIG. 1. A diagrammatic representation of a basnig net: A', B', C', D', E', F', G', H', eye splices or sling of head rope.

Fig. 2 is the structural plan of a typical net, 19 meters long, 13 meters wide, and 8 meters deep. Tables 3 and 4 show its detailed specifications and attachments of ropes, respectively. The gear has three distinguished parts, namely, the bunt or bottom, the sides, and the pull ropes. The bottom (fig. 2: CFIL) and four sides (fig. 2: ABCL, CDEF, FGHI, and IJKL) are made of 20/6 cotton seine medium laid twine net, one centimeter mesh stretched. The bottom is composed of 19 strips, each 200 meshes wide and 19 meters long joined together to form one rectangular piece (fig. 2: LCFI). Each of the two

bigger sides (fig. 2: CDEF and JILK is composed of 19 strips, each 8 meters long, while the two remaining smaller sides (fig. 2: ABCL and INGF) are each made of 13 strips of 8 meters long. The edges of the bunt are joined to the corresponding edges of the four sides and then seized with 96-thread hard laid cotton seine twine, called rib line, to give more strength to the net. The vertical edges of the sides are also joined together thus making the net assume the form of a boxlike structure (fig. 1).



1: 100

FIG. 2. Structural plan of a basnig net, 19 meters long, 13 meters wide and 8 meters deep.

TABLE 3.—Specifications of a typical basnig net.

Parts		Materials		Size of mesh stretch in cm.	Number of meshes wide	Number of pieces	Length of strips in meters	Remarks
Name	Symbol	Kind	Twine number					
B O T T O M (LCFI)	a	cotton	20/6	1	200	1	19	Strips a to s are joined together to form a rectangular piece of net, the bunt, LCFI.
	b	do	20/6	1	200	1	19	
	c	do	20/6	1	200	1	19	
	d	do	20/6	1	200	1	19	
	e	do	20/6	1	200	1	19	
	f	do	20/6	1	200	1	19	
	g	do	20/6	1	200	1	19	
	h	do	20/6	1	200	1	19	
	i	do	20/6	1	200	1	19	
	j	do	20/6	1	200	1	19	
	k	do	20/6	1	200	1	19	
	l	do	20/6	1	200	1	19	
	m	do	20/6	1	200	1	19	
	n	do	20/6	1	200	1	19	
	o	do	20/6	1	200	1	19	
	p	do	20/6	1	200	1	19	
	q	do	20/6	1	200	1	19	
	r	do	20/6	1	200	1	19	
	s	do	20/6	1	200	1	19	
S I D E (KLIJ)	a	cotton	20/6	1	200	1	8	Strips a to s are joined together to form side KLIJ. Its edge LI is likewise joined to LI of the bunt.
	b	do	20/6	1	200	1	8	
	c	do	20/6	1	200	1	8	
	d	do	20/6	1	200	1	8	
	e	do	20/6	1	200	1	8	
	f	do	20/6	1	100	1	8	
	g	do	20/6	1	200	1	8	
	h	do	20/6	1	200	1	8	
	i	do	20/6	1	200	1	8	
	j	do	20/6	1	200	1	8	
	k	do	20/6	1	200	1	8	
	l	do	20/6	1	200	1	8	
	m	do	20/6	1	200	1	8	
	n	do	20/6	1	200	1	8	
	o	do	20/6	1	200	1	8	
	p	do	20/6	1	200	1	8	
	q	do	20/6	1	200	1	8	
	r	do	20/6	1	200	1	8	
	s	do	20/6	1	200	1	8	
S I D E (CDEF)	a	cotton	20/6	1	200	1	8	Strips a to s are joined together to form side CDEF. Its edge FC is likewise joined to the edge CF of the bunt.
	b	do	20/6	1	200	1	8	
	c	do	20/6	1	200	1	8	
	d	do	20/6	1	200	1	8	
	e	do	20/6	1	200	1	8	
	f	do	20/6	1	200	1	8	
	g	do	20/6	1	200	1	8	
	h	do	20/6	1	200	1	8	
	i	do	20/6	1	200	1	8	
	j	do	20/6	1	200	1	8	
	k	do	20/6	1	200	1	8	
	l	do	20/6	1	200	1	8	
	m	do	20/6	1	200	1	8	
	n	do	20/6	1	200	1	8	
	o	do	20/6	1	200	1	8	
	p	do	20/6	1	200	1	8	
	q	do	20/6	1	200	1	8	
	r	do	20/6	1	200	1	8	
	s	do	20/6	1	200	1	8	
S I D E (FGHI)	a	cotton	20/6	1	200	1	8	Strips a to m are joined together to form side FGHI; its edge, IF, is joined to FI of bunt. The edges IH and FG are also joined to edges JI and FE, respectively.
	b	do	20/6	1	200	1	8	
	c	do	20/6	1	200	1	8	
	d	do	20/6	1	200	1	8	
	e	do	20/6	1	200	1	8	
	f	do	20/6	1	200	1	8	
	g	do	20/6	1	200	1	8	
	h	do	20/6	1	200	1	8	
	i	do	20/6	1	200	1	8	
	j	do	20/6	1	200	1	8	
	k	do	20/6	1	200	1	8	
	l	do	20/6	1	200	1	8	
	m	do	20/6	1	200	1	8	

TABLE 3.—Specifications of a typical basnig net.—Continued

Parts		Materials		Size of mesh stretch in cm.	Number of meshes wide	Number of pieces	Length of strips in meters	Remarks
Name	Symbol	Twine	Twine number					
S I D E (ABCL)	a	cotton	20/6	1	200	1	8	Strips a to em are joined together to form side ABCL. Its edge LC, is joined to edge CL of the bunt. Edges AL and BC of side also joined to edges KL and CD, respectively.
	b	do	20/6	1	200	1	8	
	c	do	20/6	1	200	1	8	
	d	do	20/6	1	200	1	8	
	e	do	20/6	1	200	1	8	
	f	do	20/6	1	200	1	8	
	g	do	20/6	1	200	1	8	
	h	do	20/6	1	200	1	8	
	i	do	20/6	1	200	1	8	
	j	do	20/6	1	200	1	8	
	k	do	20/6	1	200	1	8	
	l	do	20/6	1	200	1	8	
	m	do	20/6	1	200	1	8	
S	M	cotton	12-thread	1 1/2	5	1	24	Selvages M, N, O and P are hung to a 96 thread hardlaid cotton twine 64 meters long by passing through the top selvage meshes. This is in turn hung by seizing to Manila rope, 64 meters long by passing through the top selvage meshes. This is in turn hung by seizing to Manila rope 64 meters long and 3/8" diameter. Then selvages, M, N, O, P are joined to side DE, HG, JK and AB, respectively.
E	N	do	do	1 1/2	5	1	13	
L	O	do	do	1 1/2	5	1	24	
V	P	do	do	1 1/2	5	1	13	
A		do	do	1 1/2	5	1	13	

TABLE 4.—Rope attachment and lacing of the net.

Parts	Attachment		Materials		Length in meters	Number of pieces	Remarks
	Bottom	Rib line	Kind	Size			
Bunt			Cotton twine	96-thread hardlaid	64	1	Hanging by seizing.
Selvage	Headline	Outer	Manila rope	5/16" diameter	64	1	Hanging by seizing.
		Boltch line	Cotton twine	96-thread hardlaid	64	1	Hanging by passing through the first row of meshes.
		Pull rope	Manila rope	3/8" diameter	45	8	Each tied to the sling of the headline.

Sometimes the bunt or bottom and the two bigger sides are made by cutting the strips into 43 meters long instead of 19 meters to form the rectangular piece KDEJ. This will dis-

pense with the labor spent in joining sides CDEF and KLIJ to the corresponding edges of bottom LCFE (fig. 2). Then the sides ALBC and INGF are joined to KDEJ at edges LC and IF, respectively.

The upper edges of the sides (fig. 2, AB, DE, NG, and JK) are joined to the selvages (fig. 2: P, M, N and O, respectively) with which upper row of meshes are laced with a 96-thread medium laid cotton twine. This in turn is hung by seizing it to the head rope (Manila rope) $\frac{5}{16}$ " diameter, 64 meters long (fig. 3). To each corner and midpoint of the sides of the net on the head rope is a sling (fig. 1C, A', B', C', D', E', F', G', and H') with which the pull rope, $\frac{3}{8}$ " diameter and 45 meters long, is tied in a simple Japanese knot. In some basnig nets a 6-kilo lead weight is tied to every corner and midpoint of the bottom on the lacing twine when the net is prepared for shooting. However, these weights are usually tied at a foot on one end of the pull ropes before tying them to the sling of the headrope. This has a decided advantage over the former as it minimizes the strain and drifting of the net when the current is strong. In the presence of a cross-current, however, extra weights are tied along the rib line of the bottom and headrope. These are removed when the net is not used.

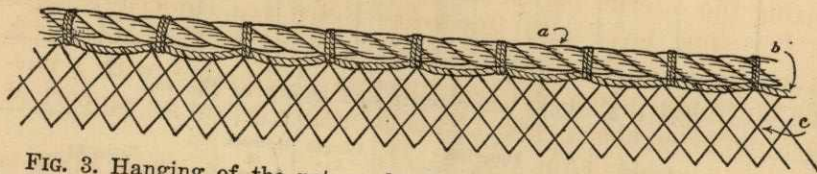


FIG. 3. Hanging of the net: a, head rope; b, lacing line; c, selvage.

When the gear is used to catch small fishes, especially young sardines, anchovies and shrimps, the bunt of the net is made of sinamay cloth instead of a fine-mesh net. In some places, however, the whole net is oftentimes made of sinamay cloth in catching varied sizes of fishes.

The vessel and other accessories.—In some places in the Sulu Archipelago, the basnig is operated between two small dugouts (fig. 7) each about half ton gross. These are made balanced by tying them secured on the opposite ends of two parallel bamboo poles: one on the stern and the other on the foredeck as the net is operated between them. A vertical pole is con-

structed at the middle of the two boats joined by a horizontal pole where an incandescent lamp is suspended at the middle.

Two boats differing in size are used in Bohol. The bigger boat is used to carry the net and fisherman to and from the fishing ground, while the small boat, called *lawagan*, carries the light which is used to attract a school of fish during the fishing operation. The fishes attracted by this boat are brought into a special compound or device (fig. 6: ABCDEFGH) where the net is set. This compound is rectangular in shape and its area is dependent upon the size of the opening of the net. An *anahaw* post with a secondary bamboo post is staked in every corner and midpoint of the side of the enclosure. Between these anahaw posts are also staked two bamboo posts except between H and A which serves as an entrance for the light boat during operation. All these posts are strengthened by two bamboo braces (fig. 6: 2 and 6) the first of which is about a meter above the surface of the water at high tide, while the second about one meter above the first. The lower brace (fig. 6: 2) serves as a catwalk for the men during the operation; the second, as a railing. Flush with the lower brace along side EFG is a bamboo platform where the net is kept during daytime and used as catwalk during operation. At corners A and C are also small platforms for the men to rest during the interim period between the operations. Across and at the same level with the lower brace are bamboo bridges over which are four bamboo posts inclined to about 60° with the horizontal plane and tied together at the apex with a one-inch diameter abaca rope. This structure serves as support of the incandescent lamp (fig. 6: 5).

There are two incandescent lamps used, each from 1,000 to 2,000 candle power. One is installed on the *lawagan* and the other over the compound. Both are used to attract a school of fish.

In most places, however, the net is operated on board a one- to three-masted boat called *basnigan* of from two to twenty gross tons. This is a dugout whose draft is increased by the addition of two or more wooden plankings on each side. This is necessary in order to increase the capacity and working space of the deck. The bow is more pointed and raised than the stern. It has two bamboo or wooden outriggers (fig. 4: g), the range of which depends upon the size of the net. Near the bow is a vertical pole (fig. 4: e) about a meter long and

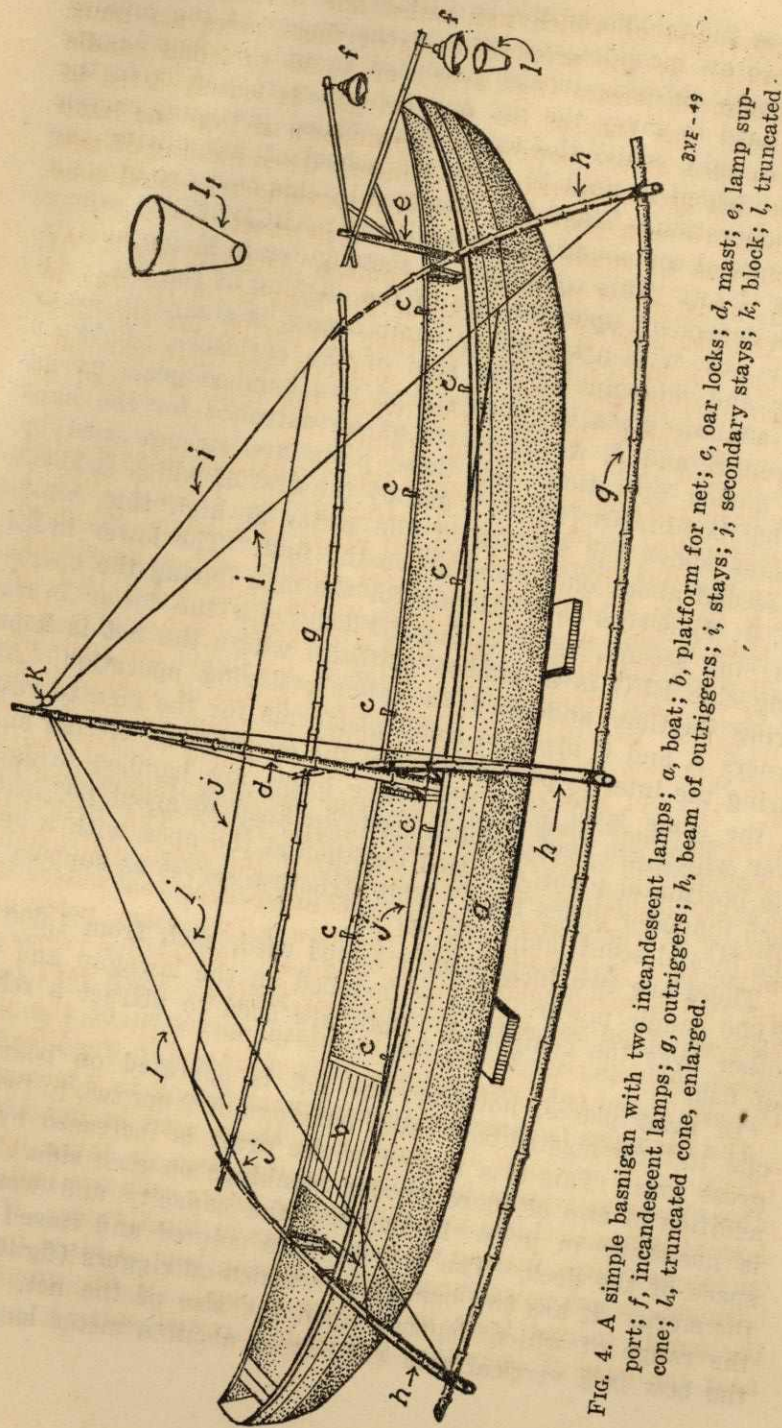


FIG. 4. A simple basnigan with two incandescent lamps; *a*, boat; *b*, platform for net; *c*, oar locks; *d*, mast; *e*, lamp support; *f*, incandescent lamps; *g*, outriggers; *h*, beam of outriggers; *i*, stays; *j*, secondary stays; *k*, block; *l*, truncated cone, enlarged.

at the upper end of which are nailed one or two horizontal wooden poles. To the proximal ends of these poles are hung the incandescent lamps (fig. 4: *f*) of 1,500 to 2,000 candle power each. The base of the vertical pole is loosely fitted to a holder nailed at the bottom of the dugout so that the lamp can be swung around towards the middeck when hauling of net. The lights are each provided with a removable truncated cone (fig. 4: *i* and *i*₁) made of galvanized iron sheet.

At the midstern of the boat is a bamboo platform (fig. 4: *b*) where the net is piled up whenever the boat is on its way to and from the fishing ground or when preparing for shooting. On each side of the boat at the middeck are four oarlocks (fig. 4: *c*) where the oars rest when the boat is rowed or towed to and from the fishing ground.

The basnigan dug-outs in Manila Bay are usually three-masted power-propelled boats of 2.5 to 4 tons gross. Plate 1 (figs. 1 and 2) are the lateral and frontal views of a banca equipped with a 20 to 35 horsepower diesel engine and a generator. The boat is also a simple dugout whose sides are raised by one or more plankings. Fig. 5 is a diagrammatic representation of its deck arrangement. Four to six lights are installed on its sides: two to three incandescent lamps of 2,000 candle power and two to three electric bulbs of 1,000 candle power each. The six bamboo poles (fig. 5: 2) called "horns" with pulleys at their free ends allow the use of a bigger net by increasing the operational area of the boat. The first two poles are lashed to the pole support of the stern and extend outward at right angles from each other over the water. A similar pair is installed near the bow. Two other poles are each tied perpendicularly to the middeck. These are removed, however, when the men are through fishing. Each pull rope passes through the pulley to facilitate operation of the net. The use of the poles are not generally practiced in the Visayas.

The basnigan is sometimes complemented by 2 to 3 lawagans (Plate 1: 3). These are similar to those used in Bohol and other Visayan waters but differ in that two or three incandescent lamps of 1,000 to 2,000 candle power each are installed on the bow area instead of only one as in the former. If the basnigan is not power-propelled, a towing boat is hired to tow the outfits to and from the fishing ground. If the ground is near the base of operation the boat is rowed only.

In 1950 surplus vessels left in the Philippines by the United States Army after World War II, ranging from 70 to 136 feet long, 16 to 24 feet beam and 5 to 8 feet draft with a rated speed of 7 to 40 knots, were reconditioned and rigged as trawlers or fish carriers. Later these were converted into basnigan. These powered basnigan have enabled the operators to extend their area of operation to farther fishing grounds as the vessels are not only capable of carrying more supplies for the fishermen but also of providing wider space to hold and preserve a bigger volume of catch. Each boat is provided

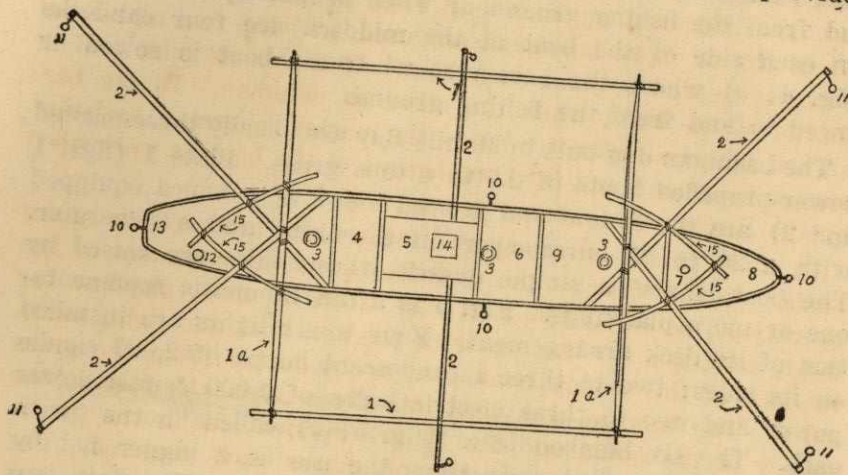


FIG. 5. A diagrammatic representation of the deck arrangement of a basnigan with engine: 1, Bamboo float of outrigger; 1a, wooden beam of outrigger; 2, detachable bamboo poles; 3, masts; 4, cooking space; 5, engine; 6, net space; 7, anchor post; 8, bow; 9, storage for fish; 10, electric lamps; 11, pulley; 12, steering wheel; 13, stern; 14, generator; 15, pole support.

with a high speed diesel engine and a generator with a capacity of 10 to 30 K.W. From 10 to 20 specially constructed electric light bulbs are installed on both sides of the boat. The electric unit is provided with a shock absorber to minimize the vibration that may be transmitted to the hull by the engine. Bamboo "horn," or booms, each from 3 to 6 meters long, are also installed along the sides about a meter from the propeller to the bow of the boat, the number of which depending upon the length of the vessel. These are held in place by stays and shrouds supported by auxiliary bamboo masts. The horns are

used to spread the net under the boat during operation. Both horns and auxiliary masts are detachable and are set in place only while at the fishing ground during fishing operation or when the net is being dried.

Number of crew.—The number of fishermen needed to operate one basnigan outfit depends upon the size of the boat. A rowed basnigan needs one master fisherman, a light man and from four to ten ordinary fishermen. The master fisherman serves as the pilot and directs the fishing operation; the light man attends to the light during the operation and one or two men are stationed on each pull rope to help spread the net. When one or more lawagans are used, at least two additional men are needed to man each boat. One acts as pilot and in charge of the light while the other as oarsman. In big basnigans, launches, or motor boats, the master fisherman, assistant master fisherman and the complement of the boat as prescribed by the Bureau of Customs are needed.

In most places all members of the crew are paid on share basis. In the Visayas the practice is that all expenses of the operation, including tow-boat hire, food of crew, gasoline for light, materials for the repair of the net, boat and light, maintenance of the towing boat, etc., are deducted from the gross sales. The balance is divided into three parts: $\frac{1}{3}$ goes to the owner of the outfit and the $\frac{2}{3}$ are divided among the fishermen according to the number of shares each received. The owner usually gives bonuses to the master fisherman and mechanic. In some places, however, the net sale is divided into two parts: one-half goes to the owner and the other half goes to members of the crew. The master fisherman and the mechanic likewise receive bonuses. In regular motor launch basnigans the fishermen and members of the crew are paid on salary basis.

Nature of fishing ground.—The most ideal ground is in sheltered bays, coves, or on the leeward side of islands where the bottom is free from snags. The basnigan is operated on any ground where pelagic fishing is found provided the current is not strong.

METHOD OF OPERATION

Basnig operations in different parts of the Philippines are basically the same varying only slightly in minor details. The

the fifth night after the full moon to the first quarter of each month, which may be extended five nights more provided the moon does not shine brightly. The net is spread under the school of fish attracted by the strong incandescent lamps then raised to impound them.

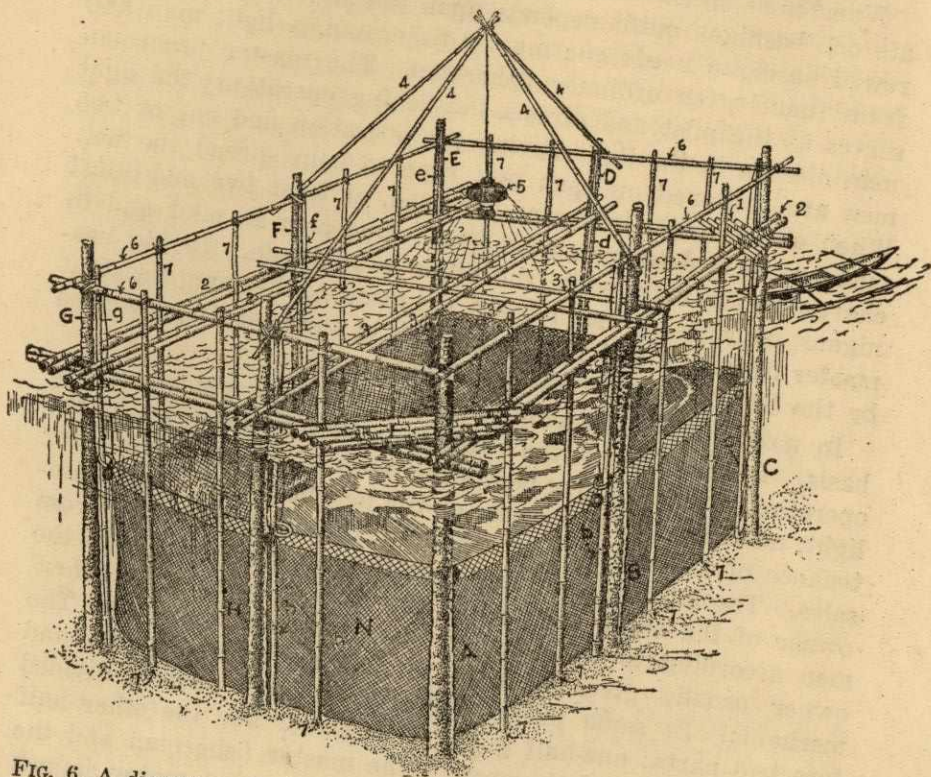


FIG. 6. A diagrammatic representation of how the basnig (bintol or New Look) net is set in Tubigon, Bohol: A, B, C, D, E, F, G and H, anahaw posts; a, b, c, d, e, f, g, and h, bamboo posts where the net slides; 1, platform; 2, cat-walk; 3, bridges; 4, hold for lamp; 5, lamp; 6, upper braces; 7, secondary bamboo posts; N, net. Not drawn to scale.

In Bohol waters the fishing outfit starts in the afternoon to be at the fishing ground at dusk. Upon reaching the ground, the light boat scouts for the fish at some distance, ranging from 100 to 500 meters, away from the compound where the net is set under water inside the ready constructed compound (fig. 6). Another lamp is also lighted inside the compound in order to attract the fish. Hauling the net is done when suf-

ficient fish have already been attracted inside the compound, otherwise it has to wait for the light boat to bring the fish into it. Before hauling the net, the lamp is covered by a truncated cone in order to concentrate the attracted fish into a small area at the center of the compound. After 10 to 20 minutes, the eight men hold the pull ropes at A, B, C, D, E, F, G, H pulling up the net simultaneously and at the same speed keeping the rings of the net approximately even. To do this, each of the eight men sounds off the length of the pull rope he had already pulled from time to time so that he may adjust in the pulling. When the rings are finally up, the pull ropes at A, B, C, D, and H are untied from the net and this part of the net brought to the GFE side by carefully passing it below the bamboo cross bridge in order not to let the fish escape. In the meantime, in order to concentrate the catch to one side of the net, the two others at G and H bring up the webbing and pile it upon the platform. The catch is then brailed out with a dip net into the basket after which the net is again set at the bottom as before for another hauling.

During the succeeding hauling the light banca slowly guides the fish it has attracted into the compound so as not to scare them. It enters the compound through the opening between posts H and A. With its light put out, it then goes out to attract another school of fish. The fishes are now under the influence of the light inside the compound where they are caught by following the same procedure aforementioned.

In some places in the Sulu Archipelago, the net is operated between two dugouts (fig. 7). As usual the net is dropped between the boats, then the light is lighted to attract the fish. Once a sufficient amount of fish has been attracted, the net is raised to get the catch.

In most places, especially in the Visayas, once the boat reaches the desired fishing ground at dusk, it is anchored with a great length of rope to allow it to drift far from the anchor; otherwise the rope may hinder the proper shooting and hauling of the net.

The lamp is then lighted to attract the fishes. As soon as a fairly large school of fish is attracted, the crew prepare for the shooting of the net. The master fisherman determines whether or not the number of fish attracted and the strength of the current warrants the successful shooting of the net. The approximate number, sizes and species of the fishes present

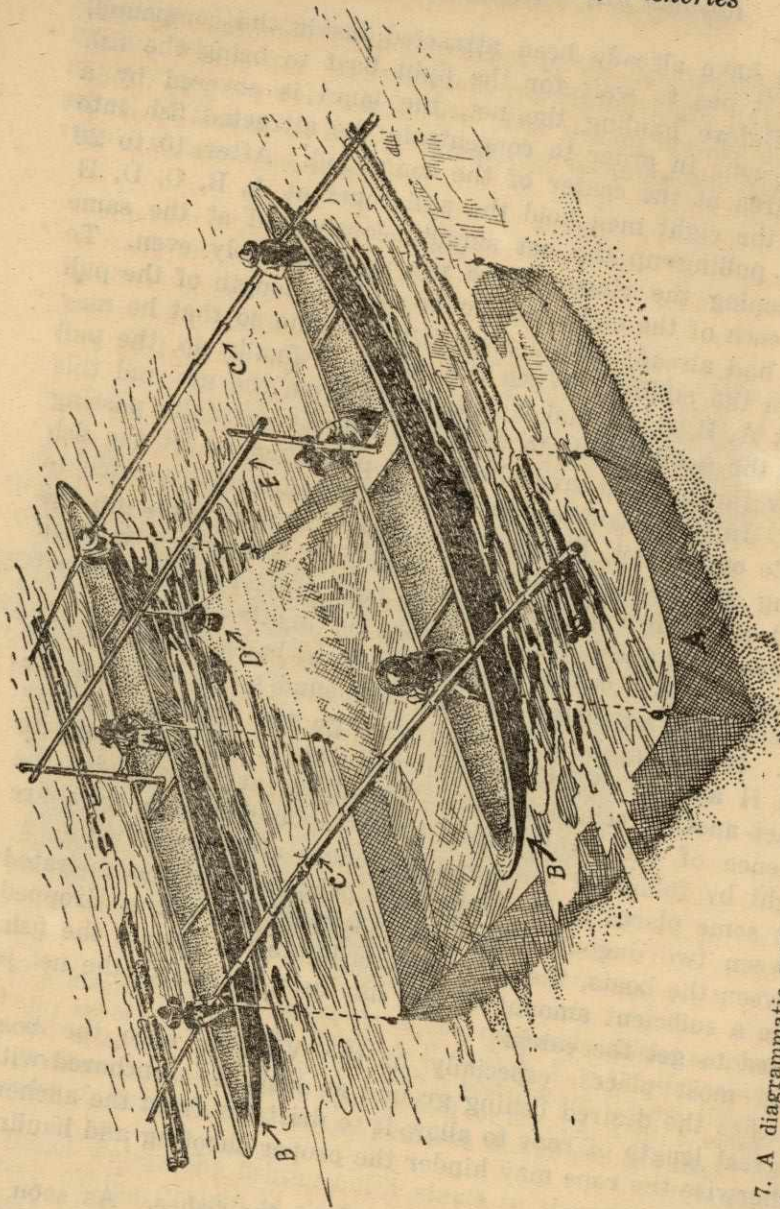


FIG. 7. A diagrammatic representation of how the basnig is operated by some fishermen in Sulu waters; A, net; B, boats; C, common outriggers; D, incandescent lamp; E, bamboo support of lamp. Not drawn to scale.

can be determined by an experienced master fisherman by the size of the school and their characteristic movement while darting over or close to the surface of the water. The fishes are, however, found deeper in the water when a generator is used for lighting the boat, so that their presence can only be detected by the appearance of bubbles or ripples coming out to the surface. These are produced by the constant movement of the fishes under the water around the light. In the absence of these bubbles, the presence of fishes can also be determined by the characteristic vibrations of the sounding line when dropped under the boat. This vibration is also caused by the movement of the fishes.

If the current is strong, extra weight may be tied at the starboard side of the net to minimize its being drifted away from its intended position. If a cross-current is present, eight extra weights are tied on the headrope and another eight around the bunt. When all these things are determined and the net readied, the master fisherman orders its shooting.

Fig. 8 is a diagrammatic presentation of the different stages of the shooting and hauling of the net. Eight pull ropes, each with a lead weight tied near one end, are tied to each of the four corners and midpoints (fig. 1: A', B', C', D', E', F', G', H') of the mouth of the net on the head rope. The free end of pull rope at A' is passed under the outrigger AB and tied at the corner A (fig. 8: 1). The free end of pull rope at B' is similarly tied at B, C' at C, D' at D, E' at E, F' at F, G' at G, and H' at H. All of these ropes should always pass under the banca and outriggers so that they will not cross them when the net is dropped and allowed to sink. When the free ends of these pull ropes are already tied, the eight men go to their respective places at A, B, C, D, E, F, G, H (fig. 8: 1). The lightman attends to the light while the last two men stand by the pile of net to feed it out. At a given signal from the master fisherman, the three men at A, H and G (fig. 8: 1) of the outrigger hold their respective ropes, AA', HH', and GG' at points A, H and G, respectively, while men at B, C, D, E, F, pull their ropes until the respective corners of the net are within their hold. Thus, the net is like a large inverted mosquito net hanging under the outriggers of the boat (fig. 8: 2 and 3). From this position and at given signal from the master fisherman, the eight men release the weighted net which readily sinks to the bottom of the water (fig. 8: 4).

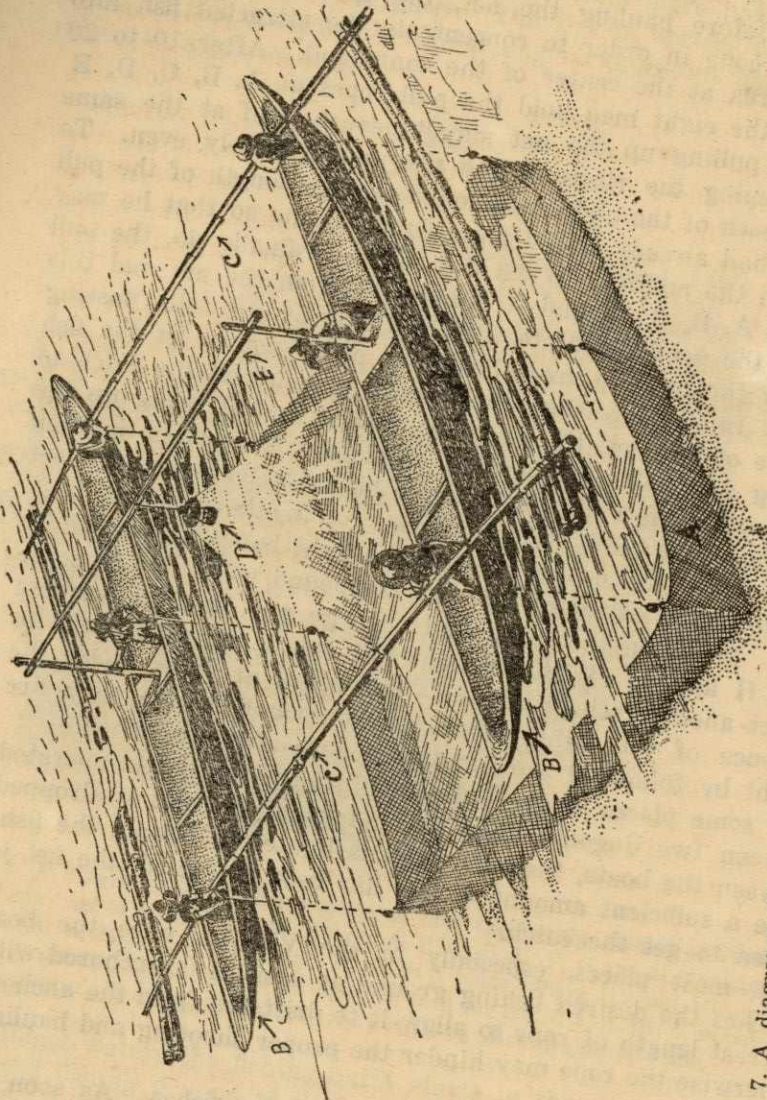


FIG. 7. A diagrammatic representation of how the basnig is operated by some fishermen in Sulu waters; A, net; B, boats; C, common outriggers; D, incandescent lamp; E, bamboo support of lamp. Not drawn to scale.

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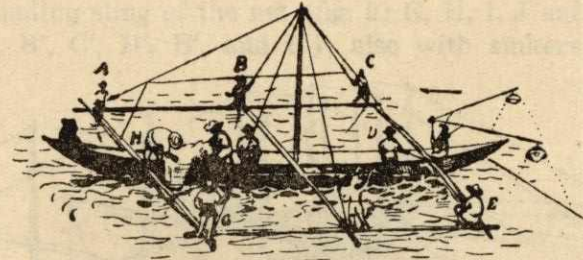
The direction of the current is aft so that the net is swept aft or beyond the boat. The light is then revolved about its pivot so that it will shine directly midship. Then the galvanized truncated cones are placed on each lamp in order to concentrate the light and the school of fish within that limited area. The lightman then goes to the anchor rope and slowly feeds it farther out so that the boat will drift toward the exact center of the net (fig. 8: 5). The hauling ropes are then quickly pulled up so that the net is brought to the surface (fig. 8: 6). Preparatory to hauling, however, some operators use dynamite to "stun", if not to kill, the fish before they are impounded by the net.

The net is then transferred to the port side of the boat where the catch is concentrated and scooped. Side D'E' of the net is hung on the outrigger DE while part of side C'D' is passed under the banca close to it so that the fish have no way of escape (fig. 8: 7). As man D holds the net D', holding it close to the banca, the anchor-man goes opposite D at X and holds the other part of the net also close to the banca. At the bow, the lightman goes opposite F at R and does the same thing; D then pulls side C'D' while C slowly releases it, and E comes forward along the outrigger toward the stern but a little later than at the bow. Finally, C' of the net is held at D so that the net is diagonally across the bottom of the boat. D continuously pulls the net towards his side, and pulls it on board the banca. Eventually, all these parts of the net on the port side will be loaded on the banca. Now, E goes toward D and G to R. All haul in the net as they move (fig. 8: 7). A goes toward S and holds a part of the net there, thus forming a rectangular area, HXSR (fig. 8: 8).

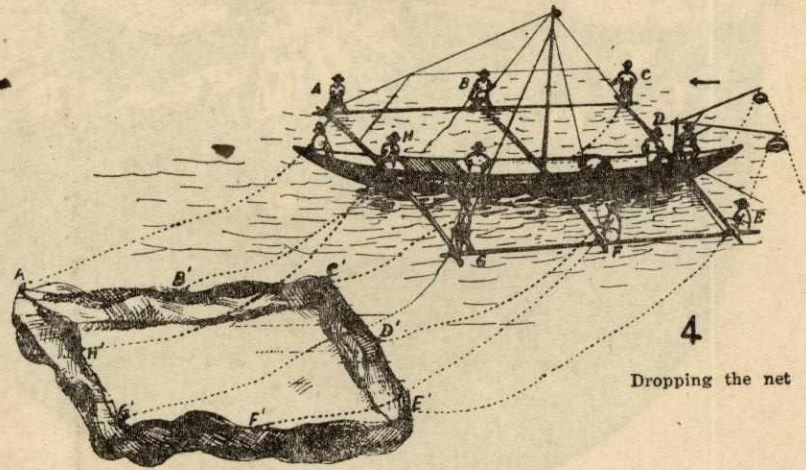
The men on the boat now pull the net along HX, thus confining the fish in the portion of the net between the banca and the outrigger RS from where they are scooped into the banca (fig. 8: 9).

The whole operation takes from 25 to 30 minutes. When the fishes are already scooped, the whole net is hauled in on the banca and transferred to another place and again made ready for another operation. The light is revolved forward so that it shines directly beyond the bow.

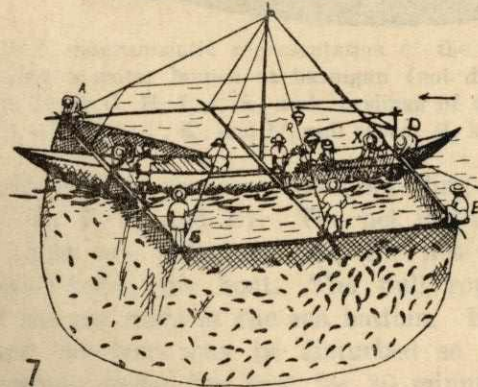
Fig 9 shows the setting of the gear with the use of a motor launch. The net is shot and hauled on the windward side of



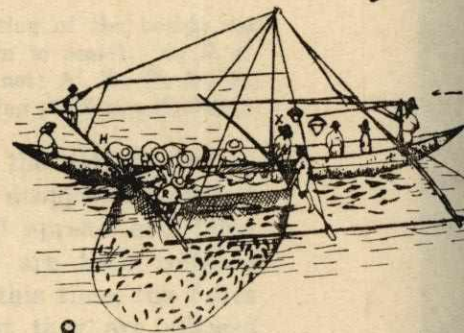
1
Passing the pull ropes under the boat to their respective places at the outrigger



2
4
Dropping the net

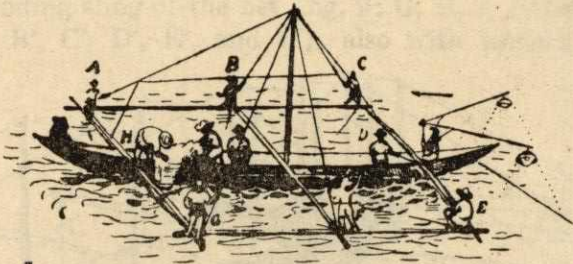


3
7
Transferring the net to the starboard side of boat

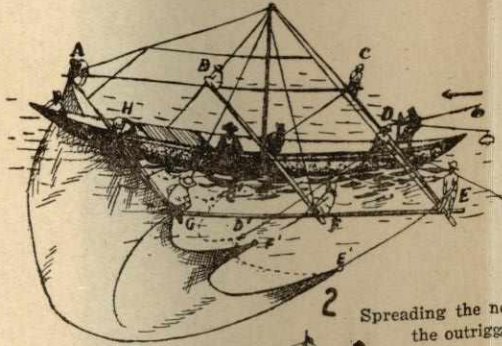


4
8
Confining the net to the hind- and mid- beams of

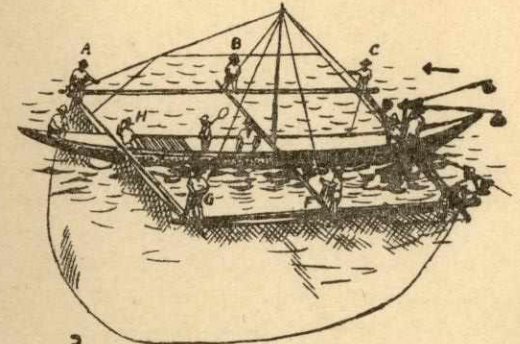
FIG. 8. A diagrammatic repr



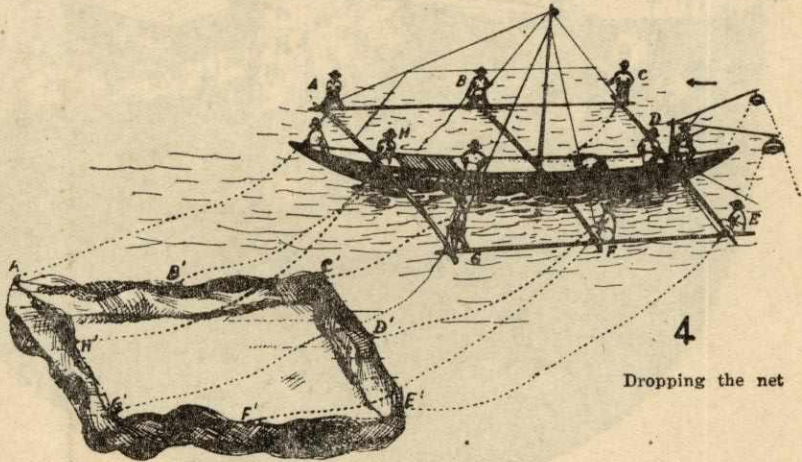
1
Passing the pull ropes under the boat to their respective places at the outrigger



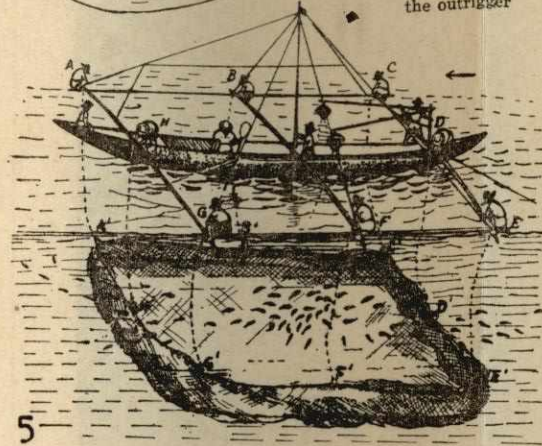
2
Spreading the net under the outrigger



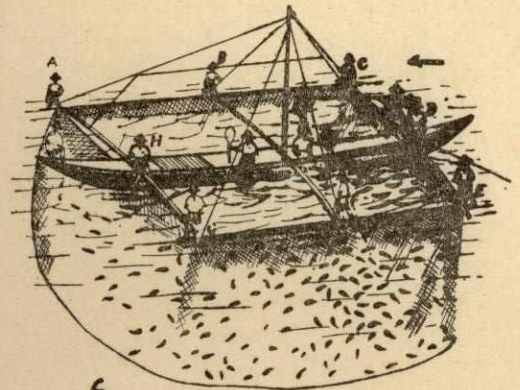
3
Net is hung under the outrigger



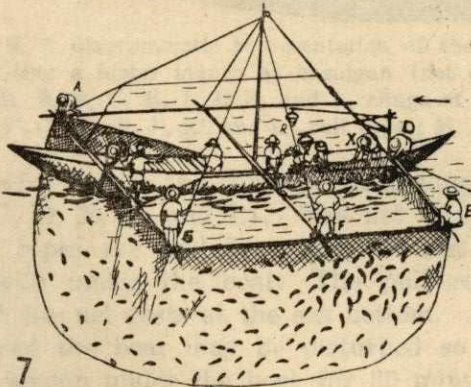
4
Dropping the net



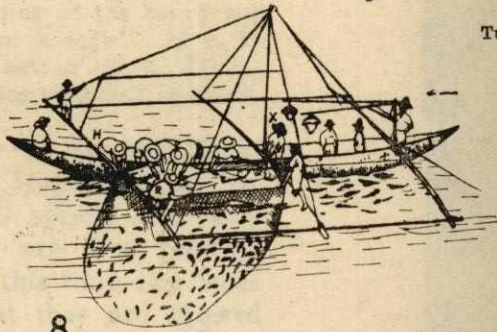
5
Turning the lamps toward midship and slowly feeding out the anchor rope so that the boat is drifted directly above the net.



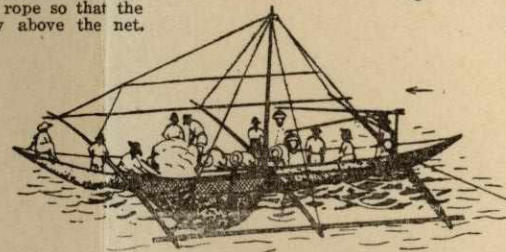
6
Hauling the net



7
Transferring the net to the starboard side of boat



8
Confining the net to the space between the hind- and mid-beams of the outrigger



9
Scooping the catch

FIG. 8. A diagrammatic representation of the operation of the basnig.

the boat. Pull ropes G', H', I', J' and K (fig. 9) with their corresponding lead sinkers are passed under the boat and tied to the corresponding sling of the net (fig. 9: G, H, I, J and K). Pull ropes A', B', C', D', E', and L'), also with sinkers, are

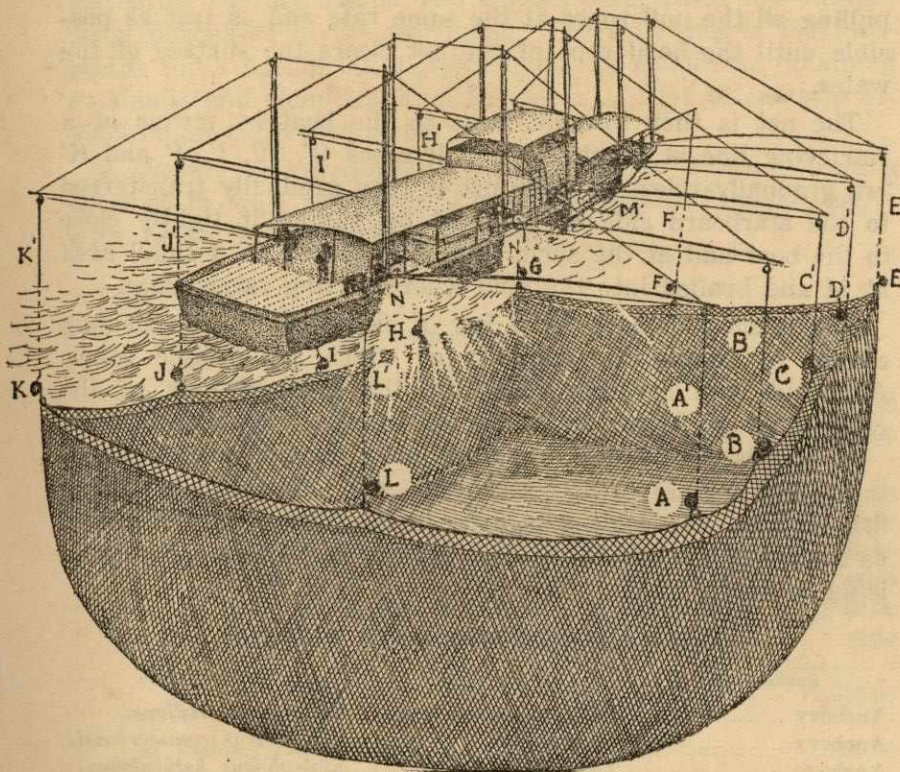


FIG. 9. A diagrammatic representation of the setting of the basnig net using a motor launch as basnigan (not drawn to scale). A, B, C, D, E, F, G, H, I, J, K, and L, slings of the net; A', B', C', D', E', F', G', H', I', J', K', and L', pull ropes; M, landing platform; N, lights.

likewise tied to the corresponding sling of the net (fig. 9: A, B, C, D, E, F, and L). The net is then dropped as all the pull ropes are pulled so that the net will spread and hung directly under the boat. The pull ropes are then released until the net rests at the sea bottom. By this time, the fishes around the boat may be disturbed so that they are allowed to regroup under the boat for 30 minutes or more depending upon the discretion of the master fisherman. When the fishes

have regrouped, all the lights except at the bases of C', D', J' and I' are put out. This will make the fish more compact. A hood is then placed on the light at the base of boom C while all the rest are put away. The net is then raised by pulling all the pull ropes at the same rate and as fast as possible until the head rope of the net clears the surface of the water.

The net is then brought close to the boat by means of a retrieving line at F while the pull ropes G', H', I', J' and K' are gradually released. The net is then gradually transferred to the starboard side of the boat by pulling it tightly close to the boat and at the same time it is placed on a small area at M and brailed into the hold where sorting takes place.

The catch.—Table 5 is a list of fishes which are usually caught by basnig the majority of which are pelagic fishes. Anchovies and sardines constitute the greatest bulk of the catch although bigger fishes are also caught from time to time. In Manila the catches are sorted into sizes and species, placed in baskets (*tiklis*) of fifty kilos each, and sold to the wholesale fish dealers. No sorting is done in the Visayas or elsewhere as the fishes are sold in whole to salters and driers. No direct icing is used.

TABLE 5.—List of fishes caught by basnig.

English name	Local names	Scientific name
Anchovy	Dilis, monamon boris	<i>Stolephorus indicus</i> .
Anchovy	Paranganon	<i>Stolephorus commersonii</i> .
Anchovy	Tuakang	<i>Stolephorus heterolobus</i> .
Gizzard shad	Dumpilas	<i>Engraulis dussumieri</i> .
Gizzard shad	Kabasi	<i>Anodontostoma chacunda</i> .
Herrings	Mararapad, suagan	<i>Nematalosa nasus</i> .
Sardines	Tuabac, dilat	<i>Ilisha hoeyenii</i> .
Sardines	Tunsoy, laolao	<i>Sardinella fimbriata</i> .
Sardines	Lapad, halubaybay	<i>Sardinella perforata</i> .
Spanish mackerel	Tamban, tuloy	<i>Sardinella longiceps</i> .
Mackerel	Tanguingue, Tanigui	<i>Cybbium commerson</i> .
Mackerel	Hasahasa, mataan	<i>Rastrelliger brachysomus</i> .
Slipmouth	Alumahan, burao	<i>Rastrelliger chrysozonus</i> .
Barracuda	Sapsap	<i>Leiognathus</i> spp.
Cavallas	Rompecandado, torsillo	<i>Sphyraena</i> spp.
Croaker	Babadlong	<i>Caranx</i> spp.
Croaker	Abo, ibot	Sciænidae.
Tunnies	Alakaak	<i>Pseudosciana anea</i> .
Tunnies	Bonito	<i>Euthynnus yaito</i> .
Tunnies	Tulingan	<i>Katsuwonus pelamis</i> .
Cavallas	Tambakol	<i>Neothunnus macropterus</i> .
Cavallas	Talakitok	
Cavallas		

Prospectus.—The amount of capital needed for basnig fishing depends upon the size of the net, number and size of boats used, and whether or not the mother boat is power-propelled. Excepting the net, lamps, and engine, other items are cheaper when purchased in the provinces. The following is the prospectus for a basnig outfit based upon the conditions obtaining in Manila and vicinities from December 1, 1951 to January 31, 1953 unless otherwise stated:

A. *Basnig operated with one nonpowered banca.*—Records obtained in May, 1952 from a basnig owner of Tanauan, Leyte with Leyte Gulf as fishing ground.

1. Capitalization—

a. For supplies and equipment:

One basnigan, 3.5 to 4 tons gross complete with a sail and 8 oars.....	₱800.00
One basnig net, 19 m. × 13 m. × 8 m.	2,300.00
Two kerosene lamps, each 2,000 to 4,000 candle power	400.00
One roll Manila rope, 5/16" diameter.....	20.00
One roll Manila rope, 3/8" diameter.....	35.00
Eight pieces lead weights, each 6 kilos.....	48.00
Sixty fish baskets, each 50 kilos of fish capacity....	60.00
One scoop net with handle.....	5.00

Total for supplies and equipment..... ₱3,668.00

b. Fishing license and taxes 300.00

c. Monthly operating expenses:

For 17 dark nights of operation, food for 12 fishermen	102.00
Gasoline	185.00
Nettings and twines needed to repair net.....	50.00
Tow-boat hire (not necessary if fishing ground is near the base of operation)	225.00
Salaries of a patron and mechanic (for tow boat)	300.00
Diesel fuel and lubricating oil for the tow boat...	450.00
Miscellaneous expenses	50.00

₱1,362.00

d. Grand total expenses for the first month..... ₱5,330.00

2. Average catch per night—250 kilos of various species of fish.

B. Basnig operated with a power-propelled banca. Data obtained in April, 1952 from an operator of Navotas, Rizal with Manila Bay as fishing ground.

1. Capitalization—

a. Supplies and equipment:

One basnigan, 3 to 4 tons gross.....	P1,500.00
One main engine, diesel, 25 horsepower.....	3,000.00
One generator, 15 KW (connected to main engine) with six electric bulbs, shades and necessary wirings	800.00
One basnig net, 19 m. × 13 m. × 8 m.p.	2,300.00
Eight wooden pulleys, 5" diameter.....	150.00
One roll Manila rope 3/16" diameter.....	17.00
One roll Manila rope 3/8" diameter.....	20.00
Eight pieces lead weights, each six kilos.....	48.00
Six bamboo poles, each 8 meters long.....	12.00
60 fish baskets, each 50 kilos of fish capacity.....	120.00
One scoop net with handle.....	10.00

Total for equipment and supplies..... P7,977.51

b. Licenses and taxes

c. Operating expenses for a period of 16 days in a month: P300.00

Fuel oil	450.00
Lubricating oil	90.00
Food of fishermen	900.00
Transportation expenses	50.00
Nettings, twines, etc.	200.00
Tanning materials	80.00

Total operating expenses for one month.... P1,770.00

d. Grand total expenses for the first month..... P10,047.51

2. Average catch per night—300 kilos various species sold in Manila market for P360.

C. Basnig operated with a power-propelled launch. Data obtained in May, 1951, from an operator of Malabon, Rizal with Palawan waters as fishing ground.

1. Capitalization—

a. Supplies and equipment:

One second hand otter or beam trawler, 25 to 45 tons gross, complete with diesel engine, one generator, navigational instruments, etc.....	P25,000.00
--	------------

Alternate:

One first hand launch, 65 long × 18 wide, 6" draft hull.....	20,000.00
Engine, high speed, diesel, 225 h.p. with 3 to 1 reduction gear.....	16,000.00

One generator 20 kilowatt with auxiliary (diesel) engine 30 h.p.	13,000.00
Navigational instruments	1,000.00
Life raft, life belts, etc.	500.00
Galley equipments (stove, plates, spoons, etc.)	500.00
Miscellaneous expenses (installations of engines)	1,000.00

Total for alternate..... P52,000.00

One basnig net.....	2,300.00	P2,300.00
Six electric bulbs, each 1,000 watt.....	50.00	50.00
Fifteen electric bulbs, each 30 watt....	15.00	15.00
One roll Manila rope 5/16" diameter....	17.00	17.00
One roll Manila rope 3/8" diameter.....	20.00	20.00
Eight pieces bamboo poles, 8 m. long..	16.00	16.00
Eight pieces lead weight, 6 kilos each	48.00	48.00
Eight pieces wooden pulleys, each 5" diameter	150.00	150.00
400 pieces bañeras at P4 each.....	1,600.00	1,600.00
One scoop net.....	10.00	10.00

Total for supplies and equipment P56,226.51 P29,226.51

b. Licenses and taxes..... P500.00 P500.00

c. Cost of operation per month:

Salaries of personnel.....	3,952.00	3,952.00
Diesel fuel and lubricating oil.....	1,598.00	1,598.00
Ice—500 blocks	1,000.00	1,000.00
Food supplies	384.00	384.00
Miscellaneous	100.00	100.00

P7,034.00 P7,034.00

d. Grand total expenses for the first month.... P63,760.00 P36,760.51

2. Average monthly sales (two fishing trips a month with Palawan waters fishing grounds and catches sold at Manila markets).

33 tons of fish worth..... P18,000.00

D. Basnig operated with 3 lawagans and a power-propelled mother boat. Data obtained in May, 1951 from an operator of Malabon, Rizal with Manila Bay fishing ground.

I. Capitalization—

a. Supplies and equipment:

1. Boats—

One mother boat (banca), 3-4 tons gross	P1,500.00
Three lawagans, each about 0.5 tons gross	300.00

2. Engines—	
One main engine, 25 horsepower, diesel....	P3,000.00
One generator, 15 KW with 6 electric bulbs, shades and necessary wirings.....	800.00
Total for engines.....	P3,800.00

3. Nets and accessories—	
One basnig net 19 m. × 13 m. × 8 m.	P2,300.00
Nine kerosene lamps, each 2,000 to 4,000 c.p.	3,600.00
Six electric bulbs, each 1,000 watts.....	10.00
60 fish baskets.....	120.00
Eight wooden pulleys.....	150.00
Eight pieces bamboo poles, each 8 m. long	16.00
One roll Manila rope $\frac{5}{16}$ " diameter.....	17.44
One roll Manila rope $\frac{3}{8}$ " diameter.....	20.07
Eight pieces lead weights, each 6 kilos....	48.00
One scoop net.....	10.00
Total for nets and other supplies....	P6,291.51

4. Grand total expenses for equipment and supplies	P11,891.51
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5. Other miscellaneous expenses (for installation engine, transportation, licenses, taxes, etc....	
P1,000.00	
b. Monthly cost of operation (for 18 dark nights only and with Manila Bay as fishing ground).	
Food for 20 fishermen.....	P270.00
Gasoline, diesel and lubricating oil.....	420.00
Nettings, twines, tanning materials, etc.	70.00
Fuel	450.00
Miscellaneous	100.00
Total	P1,310.00

c. Total expenses for the first month.....	P14,201.51
II. Average daily catch.....	900 kilos of fish.

REMARKS

The foregoing discussions show that the construction and operation of the basnig are so simple that despite its being nonpowered it requires a few men to operate. Hence, owners could operate their gear regularly every fishing month provided the weather is favorable for the operation. Their business always produces a good return to both owners and fishermen commensurate with the investment made and the relatively low cost of operation.

Considering the size and make of the net, the gear is effective for the catching of pelagic species. It is an admitted fact among operators however that there has been a noticeable decline of fish supply in fishing grounds where basnig is operated. This may be attributed to the use of fine-meshed nets, if not sinamay cloth, very powerful incandescent lamps to attract the fish, and sometimes explosives to "stun" or to kill the fishes before they are caught.

It has been observed that small fishes, especially fry, which abound in sheltered waters are the most easily attracted by light. With the use of a very fine-meshed net, if not a coarse sinamay cloth, all are caught. Thus they are not given the chance to reach sexual maturity to be able to spawn and replenish the supply.

Mackerels, tuna, bonito and other big-sized fishes are also attracted by light. Because they are active and agile, they are hardly caught by the net. Hence, the fishermen use explosives to "stun" them while the net is raised. This practice is detrimental to the fishery. Explosives are not only hazardous to the life of the fisherman but also kill fishes of all stages including their habitation and food within the area.

CONCLUSION AND RECOMMENDATIONS

1. The basnig is an effective gear for the catching of pelagic species to such an extent that unless some government regulations are promulgated to control its operation, the result would be the rapid depletion of our fish supply in the fishing ground where it is operated.

2. To further reduce the cost of operation and increase the efficiency of the gear, further experiments should be undertaken to mechanize the shooting and hauling of the net. This would make the operation faster with the least number of fishermen so that more hauls can be made in one night and that even big fishes can be caught without resorting to the use of explosives.

3. The use of sinamay cloth or a very fine-meshed net should be outlawed. Experiments should be undertaken towards the standardization of the meshes of the net in order to allow the

immature fishes to escape and grow to sexual maturity to replenish the supply. Complementary to this, researches should also be made to determine the sizes at sexual maturity of our important commercial fishes so that we can have a basis for determining the sizes of the meshes of the net.

4. More intensive patrol work should be done in places where basnig is operated so that the use of explosives in the operation is minimized if not completely stopped.

ILLUSTRATIONS

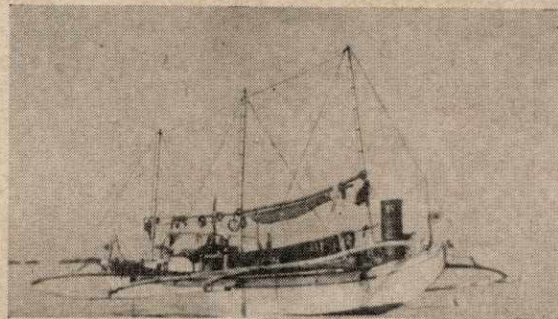
PLATE 1

- FIG. 1. Side view of a basnigan.
2. Front view of a basnigan.
3. A lawagan with three lights.

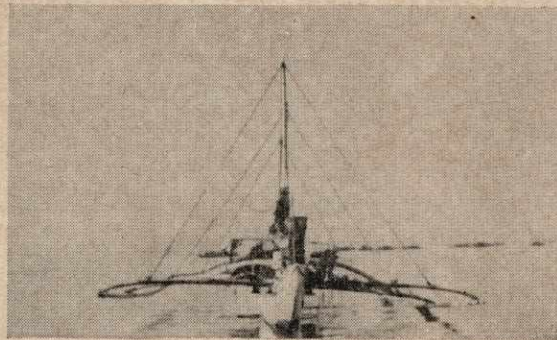
TEXT FIGURES

- FIG. 1. A diagrammatic representation of a basnig net. A', B', C', D', E', F', G', and H', eye splice or sling of head rope.
2. Structural plan of a basnig net 19 meters long, 13 meters wide, and 8 meters deep.
3. Hanging of the net; *a*, headrope; *b*, lacing line; *c*, selvage.
4. A simple basnigan with two incandescent lamps; *a*, boat; *b*, platform for net; *c*, oar locks; *d*, mast; *e*, lamp support; *f*, incandescent lamps; *g*, outriggers; *h*, beams of outriggers; *i*, stays; *j*, secondary stays; *k*, block; *l*, truncated cone; *l*, truncated cone, enlarged.
5. A diagrammatic representation of the deck arrangement of a basnigan with engine. 1, Bamboo float of outrigger; 1*a*, wooden beam of outrigger; 2, detachable bamboo poles; 3, masts; 4, cooking space; 5, engine; 6, net space; 7, anchor post; 8, bow; 9, storage for fish; 10, electric lamps; 11, pulley; 12, steering wheel; 13, stern; 14, generator; 15, pole support.
6. A diagrammatic representation of how basnig (bintol or new look) net is set in Tubigon, Bohol: A, B, C, D, E, F, G, and H, anahaw posts; *a*, *b*, *c*, *d*, *e*, *f*, *g*, and *h*, bamboo posts where the net slides; 1, platform; 2, cat-walk; 3, bridges; 4, hold for lamp; 5, lamp; 6, upper braces; 7, secondary bamboo posts; N, net. Not drawn to scale.
7. A diagrammatic representation of how the basnig is operated by some fishermen in Sulu waters. A, net; B, boats; C, common outriggers; D, incandescent lamp; E, bamboo support of lamp. Not drawn to scale.
8. A diagrammatic representation of the operation of the basnig.
9. A diagrammatic representation of the setting of the basnig net using a motor launch as basnigan (not drawn to scale). A, B, C, D, E, F, G, H, I, J, K, and L, slings of net; A', B', C', D', E', F', G', H', I', J', K', and L', pull ropes; M, landing platform; N, lights

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