E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.549
IJFAS 2017; 5(2): 319-323

www.fisheriesjournal.com
Received: 13-01-2017
Accepted: 14-02-2017

Francis Nuestro Baleta
Institute of Fisheries, Isabela State University, San Fabian, Echague 3309, Isabela, Philippines

Jaymark Guilalao Beltijar
Provincial Institute of Fisheries, Isabela State University, Matusalem, Roxas 3320, Isabela, Philippines

Jonathan Mallillin Bolaños
Institute of Fisheries, Isabela State University, San Fabian, Echague 3309, Isabela, Philippines

Correspondence
Francis Nuestro Baleta
Institute of Fisheries, Isabela State University, San Fabian, Echague 3309, Isabela, Philippines

Design, fabrication and operation of fishing gears used along the coastal areas of Isabela, Philippines

Francis Nuestro Baleta, Jaymark Guilalao Beltijar and Jonathan Mallillin Bolaños

Abstract
The study was conducted to document the design, fabrication and operation of fishing gears used along the coastal areas of Dinapigue, Palanan, Divilacan and Maconacon, Isabela, Philippines. There were thirty-three (33) different fishing gears identified and documented along the four studied stations. The fishing gears documented include; eighteen (18) lines, eight (8) nets, five (5) hand instruments, two (2) barriers and traps, one (1) aggregating device and one (1) accessory fishing device. Hook and line, multiple hooks and line and troll line are the most commonly used fishing gears by the fisher folks along the four study area. The most expensive fishing lines were *kitang* (set bottom long line) and the cheapest fishing gears were the *bakulkol* (hook and line) in terms of fabrication. Fisherfolks from the coastal towns of Dinapigue and Palanan uses *payaw* (fish aggregating device) to increase catch of tuna using multiple hooks and line.

Keywords: Fishing gear, design, fabrication, operation, methods and materials, coastal areas of isabela

1. Introduction
Marine fishery is an important source of protein, livelihood and export earnings for the Philippines. In 2010, total marine catch was estimated to 2.4 million tons which accounted for about 48% of the total fisheries production [2]. Due to limitations in fish resources, competition between fishing gear has increased frequently. To be able to compete with others, fishermen have improved in terms of technology and their fishing methods. However, fisherman responses to external factors are limited by internal factors, such as capital and fishing equipment. The fishermen utilize the external factors, especially climate and catches to adapt their behavior. Hence, fishermen's understanding of the environmental conditions (weather, waves and currents) and fishing locations, as well as skills in the operation of fishing gear and fishing tools will determine the success of fishing activities [10].
Fishing gear can be described as any kind of equipment used in harvesting, cropping, or capturing fish from any water body [9], while fishing method is how the gear is used. A fishing gear is the tool with which aquatic resources are captured, whereas the fishing method is how the gear is used. Gear also includes harvesting organisms when no particular gear (tool) is involved. Furthermore, the same fishing gear can be used in different ways. A common way to classify fishing gears and methods is based on the principles of how the fish or other prey is captured and, to a lesser extent, on the gear construction [6].There are many different types of fishing gear. Some gears have been adapted to certain species on the basis of the species special characteristics such as their behavior, their feeding and spawning migration patterns. Changes in fishery activities throughout the year are due to biological and climatic conditions. Active fishing methods have been employed ever since the Stone Age and have developed over the ages to give us the wide variety of fishing gear we have today [8].
Competition and technological advances slowly brought about improvements in fishing gear and new methods of capture appropriate to the target species sought were evolved by trial and error down through the centuries. Today there is a wide range of towed fishing gear for catching fish on the seabed, just off the bottom and in mid-water suitable for all sizes of vessel working singly or in pairs [7]. It is important to identify gear used in this area as a prelude to determining those that can be studied; redesigned if need be and improved upon. Besides, it is also important when planning a fishery and taking management decisions.

The present study was conducted to identify and document the fishing gears used along the coastal municipalities of Isabela, Philippines

2. Materials and Methods

2.1 Description of the study area

The study was conducted along the four coastal Municipalities of Isabela, (coordinates: 17º 23' 39" N latitude, 122º 40' 18" longitude) (Fig. 1). The coastal municipalities of Isabela are mainly mountainous, dominated by rivers and sea. The only way to go there is through airplane, motor boat, and by walking.

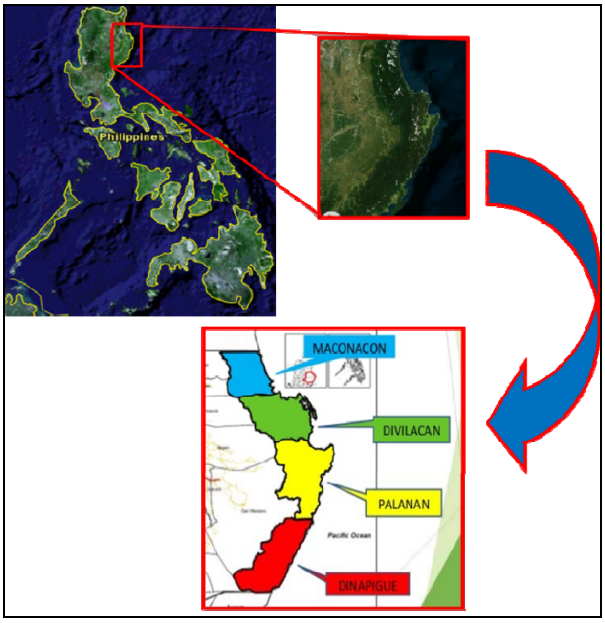

Fig 1: Location map showing the four coastal municipalities of Isabela, Philippines

2.2 Research design and duration

On the gathering of data, the researcher used semi structured questionnaire and interview among fishermen in four stations in order to document each fishing gear according to its design, fabrication and operation and also the local name of each fishing gear. The study was conducted from April to November 2015.

2.3 Respondent

The respondents came from the four coastal municipalities of Isabela namely: Dinapigue, Divilacan, Maconacon and Palanan. Ten (10) fisherfolks were interviewed in each municipality.

2.4 Fishing gear

The local name (*Paranan* and *Iloko*) of each identified fishing gear were documented. Fisherfolks were interviewed on the utilization and catch composition of the fishing gears.

2.5 Sketch and design

Sketch of each identified fishing gear was prepared based from the actual gear and description made by the fisherfolks interviewed.

2.6 Methods of fabrication

Each fisherfolk was interviewed on the method of fabrication of each identified fishing gear. The materials used, mode of fabrication and cost estimate per fishing gear were also asked during the interview.

2.7 Method of operation

The researcher asked each fisherfolk to describe the method of operation of each fishing gear. The fisherfolk was also asked to demonstrate the proper use of some fishing gears.

2.8 Catch composition

The catch composition per identified fishing gear was determined by interviewing each fisherfolk on the fish species caught per fishing gear. The local names (Paranan and Iloko) of the fishes caught by fishing gears were also documented.

3. Results

3.1 Fishing gear Classification

The result showed that there are thirty-three (33) different municipal fishing gears being used by fisher folks along the coastal municipalities of Isabela. It consists of twenty-four (24) active and eleven (12) passive fishing gears. There are two(2) barriers and traps, five(5) hand instruments, eight (8) nets and eighteen (18) lines fishing gear is presented in Table 1.

Fishing gears belong to the category of "lines" are the most predominant category of fishing gears used along the coastal municipalities of Isabela, Philippines. Fishing gears used this category includes hook and lines, Multiple handlines, multiple hook and line, set bottom longlines, troll lines, squid jigger, jigger, octopus fishing lure and alpaca.

Fishing gears belonging to the category of "nets" followed after lines, generally under this category includes gill net, cast net, seine net, beach seine and set bottom large mesh net. Hand instrument category of fishing gears makes third and under this category are spear gun, harpoon, hand spear, scoop net and push net. On the other hand, only few fisherfolk from the four coastal municipalities used fishing gears under the category "barriers and traps" which include crab lift net and fish pot (Fig 2).

Table 1: Barriers and traps, hand Instrument, nets and lines identified and documented in the four coastal municipality of Isabela, Philippines.

Category and Local name	English name	Dinapigue	Palanan	Divilacan	Maconacon	Types of gear
Barriers and Traps						
Bintol	Crab lift net	✓	✓	✓	✓	p
Bubo	Fish pot	x	✓	✓	✓	p
Hand Instrument						
Pana	Spear gun	✓	✓	✓	✓	a
Battek	Hand spear	✓	✓	✓	✓	a
Sarung	Scoop net	✓	✓	✓	✓	a
Sayut	Push net	✓	✓	✓	✓	a
Tarapang	Harpoon	✓	✓	✓	✓	a
Nets						
Sigay	Gill net	✓	✓	✓	✓	p

Panting ibabaw	Drift gill net	✓	✓	✓	✓	a
Panting ilalim	Set bottom gill net	✓	✓	✓	✓	p
Pangulong	Encircling gill net	✓	✓	✓	✓	a
Sabud	Cast net	✓	✓	✓	✓	a
Karid	Seine net	x	✓	✓	✓	a
Pukot	Beach seine	x	✓	x	X	a
Panting kalabaw	Set bottom large mesh net	x	✓	✓	✓	p
Lines						
Pasayad	Hook and line	✓	✓	✓	✓	a
Parubaw	Hook and line	x	✓	✓	✓	p
Bakulkol	Hook and line	x	✓	✓	✓	p
Paulad	Hook and line	x	✓	✓	✓	p
Tapon-tapon	Hook and line	✓	✓	✓	✓	a
Ug-ug	Multiple hook and line	✓	✓	✓	✓	a
Kasikas	Multiple hook and line	✓	✓	✓	✓	a
Bira-bira	Multiple hook and line	✓	✓	x	X	a
Kitang	Set bottom long line	✓	✓	✓	✓	p
Kanaway	Set bottom long line	x	✓	x	X	p
Hilada	Troll line	✓	✓	✓	✓	a
Saliwsiw	Troll line	✓	✓	✓	✓	a
Saliwsiw tuna	Troll line	x	✓	x	X	a
Light-light	Squid jigger	✓	✓	✓		a
Aya-aya	Longline jigger	x	✓	✓	✓	a
Pampogita	Octopus luring device	✓	✓	✓	✓	a
Rapala	Fishing lure	✓	✓	✓	✓	a
Alpaka	Alpaca	✓	✓	✓	✓	a

Legend: ✓- present x -absent p - passive a - active

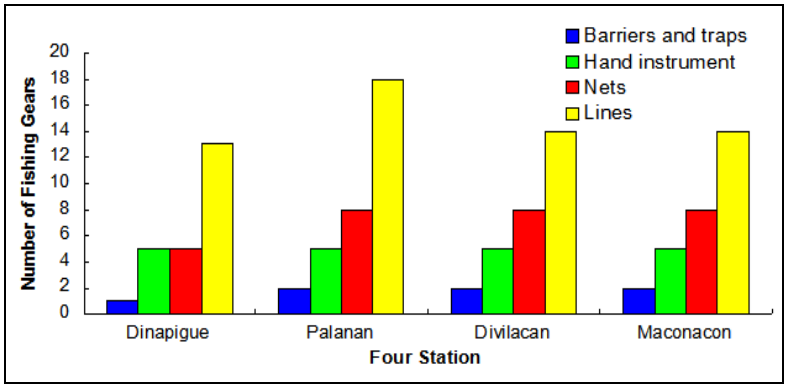

Fig 2: Classification based on fabrication type of fishing gears identified used along the four coastal municipalities of Isabela, Philippines

With regards to the classification based on the movement of fishing gears, active gears are the most predominant among the four coastal municipalities of Isabela. Active gears used by the fisherfolk in those municipalities includes spear gun, harpoon, hand spear, scoop net, push net, cast net, seine net, beach seine, *pasayad, rapala, tapon-tapon, paulad* (hook and line), *saliwsiw, saliwsiw tuna* (multiple hook and line), *hilada*(troll line), *light-light* (squid jigger), *aya-aya*(jigger), *pampogita*(octopus luring device), and alpaca. Passive gears includes *bintol* (crab lift net), *bubo* (fish pot), *sigay*(gill net), *pangulong*(encircling gill net), *panting kalabaw*(set bottom large mesh net), *bakulkul*(hook and line), *kanaway*(multiple hand line) and*kitang*(set bottom long line) (Fig 3).

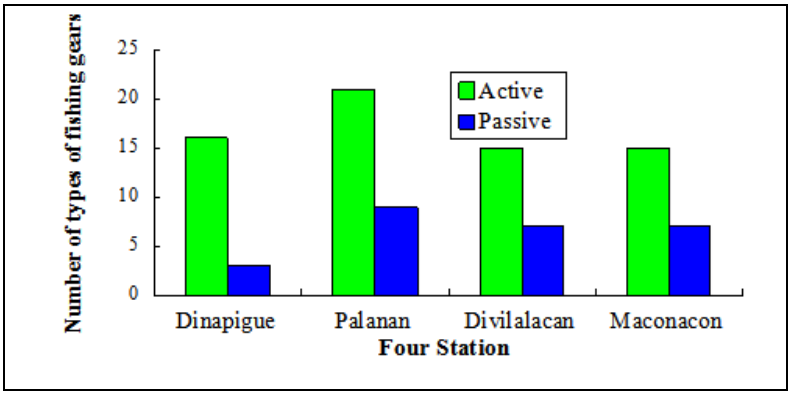

Fig 3: Classification based on movement of passive fishing gears along the four coastal municipalities of Isabela, Philippines

4. Discussion

The study showed that a variety of fishing gears are being operated throughout the year along the four coastal areas of Isabela, Philippines for municipal fishing. A total number of thirty-three (33) fishing gears used were documented and identified in the study area. The fishing gears were first categorized into textile and non-textile fishing gears and classified further as hand instruments, barriers and traps, fishing nets and lines. The most predominant fishing gears used belongs to the category of lines, which is composed of eighteen types includes: *pasayad, rapala, tapon-tapon, parubaw, bakulkul, paulad* (hook and line), s*aliwsiw, saliwsiw tuna, kanaway* (multiple hand line), *ug-ug, bira-bira, kasikas,* (multiple hook and line), *kitang* (set bottom long line), *hilada* (troll line), *light-light* (squid jigger), *aya-aya* (jigger), *pampogita* (octopus luring device) and alpaca. Fisherfolk from Palanan used *saliwsiw* to catch tuna through the use of motorized boat.

Among the eighteen types of fishing lines, hook and lines is the most commonly used, and cheapest in terms of cost. Hook and lines is the most common fishing gear for both municipal and commercial sectors, it rank sixth (6th) by producing 24,270 or 2.72 % in commercial Fisheries Production in 1995. In the municipal sector, hook and lines is the second most productive gear producing 187,502 MT or 28.87 % of the sectors catch in 1995. It uses a banca less than 3 GT which are either motorized or non-motorized. In addition, hook and line has many variations in terms of design, construction and techniques of operation [3].This study revealed that line is the most predominant category of fishing gears used along the study area. Fishing gears belonging to the category of lines are the simplest gear employed for fishing which is composed of lines, hook and baits [5]. The main reason for its predominance is the ease of fabrication and operation, and the lowest in terms of cost of fabrication. Lines can be also operated at different depths of the water and it can be used either at summer or rainy season.

Nets are the second most predominant category of fishing gears in our study. There are eight (8) types of fishing nets identified, namely:gill net, set bottom gill net, encircling gill net, cast net, seine net, beach seine and set bottom large mesh net. Fisherfolk of Palanan only used beach seine because the fishing ground is characterized by sandy bottom of the sea shore line.Among fishing nets, gill net is the most commonly used type of net along the four coastal municipalities of Isabela, because of its widely used for operation to catch different types of fishes like mullet, sardines and other school of fishes near the seashore through entangled. In related study, gill net is the most productive municipal fishing gear contributing 258, 021 MT or 32.9 % of the municipal fishing gears. It is also characterized in simplicity in its designed, construction, and operation and low investment cost preferred for small-scale fisherman. The design usually conforms to the behavior and type of the target species including habitat and swimming layers [4].

There were five (5) hand instrument identified along the study area which includes: spear gun, hand spear, scoop net, push net and harpoon. Among these fishing gears, hand spear is the cheapest type of gear in terms of cost of fabrication. The most commonly used hand instrument along the four coastal municipalities is spear gun because of its capability to catch fast moving fishes through diving. In related study, there are many miscellaneous types of gear used by fisherman. Although their existence is unrecorded, most of them were considered accessories or secondary part of the major fishing gear for catching for particular species. It covers a variety of gear with mixed method and technique of operation by the used of hands [3].

Two types of barriers and traps were identified and documented along the study area were namely *bintol* (crab lift net) and *bubo* (fish pot). These types of gears are being used along the four coastal municipalities, except for the "*bubo"*.Fisherfolk from Dinapigue are not using bubo in their fishing operation because their fishing ground is the open sea where strong water current prevails, and this strong water current may destroy fish pot. Trap fishing is one of the stationary fishing gears with many variations in structural form, material used, and operation techniques and targets species. Trap fishing is classified into four (4) types in the municipal fishing sector. They contributed 7.17 % of the municipal fishery production in 1995 [3].

Catch composition of fishing gears varies according to season. The most predominant family of fish documented along the coastal areas of Palanan, Isabela belongs to the following families: Acanthuridae, Carangidae, Scianidae, Mugilidae and Serranidae [1]. In the present study, the most predominant fishes includes tuna, mackerel caranx, scads, and surgeon fish. This groups of fishes were identified and documented along the four coastal municipalities of Isabela Philippines. Pelagic fishing for tuna and other smaller pelagics and invertebrates is done by purse seine, ring net, bag net, hook and line, push net, gill net troll line, drift filter net, android haul seine. Demersal fishing is done by primarily by trawl, Danish seine, beach seine, and drive-in-net. The utilization of these fishing gears vary from region to region, and their operation is affected by the prevailing monsoon and fishing season. In coastal waters, many kinds of fishing gear and methods are used by the fisherman making the fishing effort very high and contributing to over fishing [3].

5. Conclusion

There are thirty-three (33) different municipal fishing gears are used by fisher folk along the coastal municipalities of Isabela. It consists of twenty-four (24) active and eleven (12) passive fishing gears. There are eighteen (18) lines fishing gear, eight (8) nets,five (5) hand instruments, two (2) barriers and traps, one (1) accessory fishing device and one (1) fish aggregating device. Fisherfolk from Dinapigue and Palanan are using payaw to increase tuna catch through vertical long line fishing. Utilization of fishing gear depend on the target species behavior and characteristics, including the season, the fishing area and weather condition that affects the fishing operation. The most expensive fishing gear used identified and documented is beach seine that need more labored person to operate.

The most common and cheapest fishing gear used are in the category of line and barrier and traps gears is hook and line (*bakulkol*) and harpoon (*tarapang*), that composed of hook and nylon.

6. References

1. Baleta AN, Baleta FN. Species Composition of Marine food Fishes at Palanan, Isabela as Influence by seasonal Variation. Int. J of Fisheries and Aquatic Studies. 2016; 4(3):414-420.
2. Bureau of Agriculture Statistics (BAS). Fisheries Statistics of the Philippines. Fisheries Statistics Division, BAS, Dept. of Agriculture, Quezon City, Philippines.

2011; 19:404
3. Dickson JO, Alba EB, Munprasit A, Chokesanguan B, Siriraksophon S, Ruangsivakul N *et al.* Fishing Gear and Methods in Southeast ASIA: III Philippines, Part 2. Bureau of Fisheries and Aquatic Resources (BFAR) of the Philippines. South-east Asian Fisheries Development Center (SEAFDEC)/Training Department P.O. Box 97, Pharasamutchedi, Samut-Phrakan, 10290, Thailand. 2004, 211-390.
4. Dickson JO, Alba EB, Munprasit A, Chokesanguan B, Siriraksophon SR, uangsivakul N, Prajakjitt P. Fishing Gear and Methods in Southeast ASIA: III Philippines, Part 2. Bureau of Fisheries and Aquatic Resources (BFAR) of the Philippines. Southeast Asian Fisheries Development Center (SEAFDEC)/Training Department P.O. Box 97, Pharasamutchedi, Samut-Phrakan, 10290, Thailand. 2003, 1-110.
5. Eyo JE, Akpati CI, Ezenwaji HMG, Inyang NM, Orji EC. (Eds.). Fishing gears and Methods. Proceedings of the UNDP-Sponsored Training Workshop on Artisanal Fisheries Development. Held at University of Nigeria, Nsukka. 1995, 143-159.
6. FAO. Hook and Lines. Fishing gear types, Food and Agricultural Organization United Nation, Rome, Italy. 2015. (http://www.fao.org/fishery/geartype).
7. Galbraith RD, Rice A. An Introduction to Commercial Fishing Gear and Methods Used in Scotland, Fisheries Research Services, Scottish Fisheries Information Pamphlet No. 2.Scottish Executive. 2004, 1-44.
8. Hanssens O. Description of Relevant Fishing Gear and Fishery Activities in the Norwegian Economic Zone. Directorate of Fisheries. 2010. (http://www.npd.no/en/Seismic/Description-of-relevant-fishing-gear).
9. Nuhu MB, Yaro I. Selection of efficient hanging ratios of gill net on fish catch in Lake Kainji, as a means of alleviating poverty among artisanal fishermen. In: P.A. Araoye (Ed). Proceedings of the 19 Annual Conference of the Fisheries Society of Nigeria (FISON). 2005, 64-7.
10. Salas S, Gaertner D. The behavioral dynamics of fishers: management implications. Fish and Fisheries. 2004; 5:153-167.