Research Article

Baseline Assessment of Marine Resources Caught by Fishermen in Selected Coastal Barangays of Cawayan, Masbate, Philippines

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ABSTRACT

Marine resources have been essential for human consumption and livelihood activities, particularly for small-scale fishermen in the fishing industry. This study employed a descriptive research design, utilizing interviews and structured survey questionnaires for data collection. The findings revealed the presence of 28 fish species caught by the fishermen in Cawayan, including Asian seabass, bisugo, dolphin fish, giant trevally, gold band goatfish, grouper, lattice monocle bream, mackerel tuna, mullet, needlefish, narrow barred, octopus, oxeye scad, pink shrimp, pin spotted spinefoot, pony fish, sardines, sailfish, shark, short mackerel, slip mouth fish, squid, stingray, threadfin emperor, whiting, and yellow stripe scad. The study also identified five shellfish species, namely baler shell, fierce shell, mother-of-pearl shell, scallop, and ark shell. Seaweed species, including sea moss and sea grapes, as well as the presence of blue crab, contributed to the diverse marine ecosystem. Age emerged as a significant factor in fishing, as older fishermen exhibited extensive knowledge and expertise in identifying the caught fish species. Younger individuals, on the other hand, demonstrated physical strength and minimized the risk of work-related injuries. Notably, a significant portion of fishermen (32%) operated boats they did not own, with motorboats being the preferred choice for the majority (93%). Additionally, 72% of respondents indicated that their fishing income covered only their daily expenses, while 57% lacked alternative sources of income during unfavorable weather conditions. The researchers recommend educating and equipping fishermen with the latest fishing knowledge and skills, facilitated by collaborative efforts among the Bureau of Fisheries and Aquatic Resources (BFAR), local government units (LGUs), community extensionists, and extension workers. Sharing sustainable and advanced fishing practices will contribute to the well-being and long-term prosperity of fishing communities.

Introduction

Marine resources play a crucial role in the food consumption and livelihood activities of human beings, particularly in the fishing industry for small-scale fishermen. In the Philippines, the fishing area encompasses a significant portion of the country, with 301,000 km² designated for fishing purposes (Salvador & Lamarka, 2017). The Philippine Statistics Authority (2022) reported fluctuations in the volume of fisheries production, indicating a decline in recent years. In 2020, total fisheries production reached 4,400.37 thousand metric tons but experienced a negative growth rate of -0.3%. Similarly, in 2021, the production decreased further to 4,248.26 thousand metric tons, with a growth rate of -3.5%. However, there was a slight improvement in 2022, with a production volume of 4,339.89 thousand metric tons and a growth rate of 2.2%. Despite this, the estimated fishing production in the first quarter of commercial fisheries in 2022 experienced a significant decline of 80% compared to the previous year (PSA, 2022). This continuous decrease in marine resource production is alarming, given the significant reliance of the population on marine species for sustenance and livelihood.

In the Bicol Region, particularly in the coastal municipalities, diverse marine species are caught by the local fishermen. These include Snapper (Maya-maya), Anchovies (Dilis), Roundscad (Galunggong), Siganid (Samaral), Skipjack (Gulyasan), Parrotfish (Isda ng loro), Indian mackerel (Alumahan), Fimbriated sardines (Tunsoy), Crevalle (Salay-salay), Threadfin bream (Bisugo), Spanish mackerel (Tangigue), Big-eyed scad (Matangbaka), Acetes (Alamang), Caesio (Dalagang-Bukid), Fimbriated sardines (Bolador), Blue crab (Alimasag), Treadfrin bream (Bisugo), Round herring (Tulis), Eastern little tuna (Bonito), Squid (Pusit), Bigeye tuna (Tamban), Yellowfin tuna (Tambakol), Mullet (Kapak), Grouper (Lapu-Lapu), Hairtail (Espada), Cavalla (Talakitok), Slipmouth (Sapsap), Porgies (Pargo), Siganid (Samaral), Indo-pacific mackerel (Hasa-hasa), Goatfish (Saramulyete), and Frigate tuna (Tulingan) (Olaño et al, 2018).

Similarly, the coastal areas of Masbate boast a wide range of marine species caught by local fishermen. These include Acetes (Alamang), Anchovies (Dilis), big eye scad (Tambakol), Bigeye tuna (Bariles), Blue crab (Alimasag), Caesio (dalagang bukid), Cavalla (talakitok), Crevalle (Salay-salay), Eastern little tuna (Bonito), Fimbriated sardines (Tunsoy), Flying fish (Bolador), Frigate tuna (Tulingan), Goatfish (Saramulyete), Grouper (Lapu-lapu), Hairtail (Espada), Indian mackerel (Alumahan), Bali sardinella (Tamban), Indo-pacific mackerel (Hasa-hasa), Mullet (Kapak), Parrotfish (Isda ng Loro), Porgies (Pargo), Round herring (Tulis), Roundscad (Galunggong), Siganid (Samaral), Skipjack (Gulyasan), Slipmouth (Sapsap), Snapper (Maya-maya), Spanish mackerel (Tanigue), Squid (Pusit), Threadfin bream (Bisugo), Yellowfin tuna (Tambakol), Milkfish (Bangus), Tiger prawn (Bulik), and Eel (Igat) (Mendoza & Soliman, 2017).

However, despite the abundant marine resources, the fishing gear and techniques used by the fishermen are often inadequate to sustainably catch fish, leading to a decline in resource availability. The experience of older fishermen is no longer sufficient to maintain optimal catch levels, necessitating a deeper understanding of the demographic profile of the fishermen (Preña & Labayo, 2021). Marine and coastal ecosystems provide various services essential for human well-being, including provisioning, supporting, cultural, and regulating services (Meesa & Bhandari, 2023). These ecosystems host a wide range of living resources, from microorganisms to large fish and animals, which contribute to the overall abundance of marine resources (Elegbede & Ngo-massou, 2022). Proper management of coral reefs has been shown to enhance fish yields for traditional fishers while simultaneously protecting and preserving near-shore coral reef habitats (Osorio & Green, 2005). The fisheries sector plays a vital role in the Philippine economy, providing employment, and income, and meeting local food security and nutrition needs (Samonte & Ramenzoni, 2016). To protect and sustain fisheries, the Philippines has

established over 1000 marine protected areas (Zhang & Gao, 2022). However, the fishing industry faces numerous challenges such as water pollution, overfishing, destructive fishing techniques, fishery resource destruction, and habitat loss, all of which have detrimental effects on the economic conditions of fishermen (Dela Cruz & Magdaraog, 2014). Understanding local livelihood practices, perspectives, and the utilization of marine resources is crucial for achieving optimal community support and participation in coastal conservation management (Heuer & Navareettee, 2008).

Coastal areas worldwide are experiencing rapid and unplanned development, population growth, and demographic changes, resulting in the loss of habitats, increased erosion, and ecological degradation (Satumantpan & Chuenpagdee, 2022). Despite conservation efforts, destructive extraction practices and unsustainable resource utilization persist. Conflicts arise between corporations exploiting coastal and marine resources and indigenous communities that rely on these resources for their livelihoods, leading to severe environmental damage (Salam, 2018; Obie, 2018). The adoption of a co-management approach in coastal and marine areas can improve the protection and conservation of natural resources, ensuring shared responsibility among users (Zafahrullan Jattak, 2022). Understanding the perceptions of local communities regarding coastal and marine resources can assist local government units and law enforcement agencies in forecasting future resource statuses and guiding protective actions (Tambak & Guihawan, 2022). Furthermore, considering the potential impacts and variability of climate change, community responses to climate change may have substantial effects on coastal and marine ecosystems (Rubieke et al., 2023).

This study aims to conduct a baseline assessment of the marine resources caught by fishermen in selected coastal barangays of Cawayan, Masbate, Philippines. The assessment will encompass the demographic profile of the fishermen, as well as the different species of marine resources captured. The findings will provide valuable insights into the sustainable management and conservation of marine resources in the study area, contributing to the overall understanding of the dynamics between coastal communities and marine ecosystems. This research aims to contribute to the existing knowledge on marine resource utilization, the challenges faced by coastal communities, and the potential strategies for sustainable resource management. By addressing the current gaps in understanding, this study will provide a foundation for informed decision-making and policy development, with the ultimate goal of promoting the long-term well-being of both the fishermen and the marine ecosystems they rely on.

Methods
Research Design
In this study, a descriptive design was employed. The study was conducted in four Coastal barangays of Cawayan, where selected fishermen were surveyed to determine the different kinds of marine resources. The data was gathered through surveys administered to the selected respondents. The population consisted of 176 individuals, with 44 respondents from Mahayahay, Divisoria, and Begia each, and 42 respondents from Recodo. The use of a descriptive design in this study enabled researchers to systematically collect accurate data from a specific population. It aided in establishing a baseline for the marine resources under investigation.

Sampling
Convenience sampling was employed to obtain the data, whereby researchers approached the available fishermen in the selected barangays of Cawayan. The sample size was determined using Slovin's formula. A total of 44 respondents were included from Mahayahay, Divisoria, and Begia, while 42 respondents were included from Recodo. In total, 174 fishermen were interviewed, and 18 interviewers were assigned to the selected barangays.

Data Collection
Primary data was collected for this study using a combination of structured survey questionnaires, informal interviews, and observations. The survey questionnaire was adopted from the study of Cubelo (2016) and made some revisions to cater the fisheries related

information. Detailed structured surveys were conducted with fishers actively engaged in fishing activities in the Cawayan coastal area. These surveys aimed to gain comprehensive insights into various aspects, such as the seafood supply chains operating in the area, the types and quantities of catches, and the number of fishermen involved in the region. Furthermore, informant interviews were conducted with local communities and fishers to obtain a deeper understanding of the marine resources and to assess the status of their exploitation in the Coastal barangays of Cawayan.

Statistical Analysis

The collected data were subjected to descriptive statistical analysis. Frequency distribution and percentages were utilized to examine the fishing methods employed by the fishers in the selected barangays of Cawayan. Additionally, survey data were analyzed to identify any associations between specific attributes related to marine resources.

Results and Discussion
Demographic Profile of the Fishers

The demographic profile of the fishers in the four barangays of Cawayan was examined, focusing on age and educational attainment (Table 1). The age of fishers varied across the barangays, with different percentages in each category. The majority of fishers fell within the 21-40 years old category in all barangays, with Mahayahay having the highest percentage at 66%. On the other hand, there were no fishers below 20 years old in Mahayahay and Begia. In terms of educational attainment, the fishers exhibited diverse levels of education. The majority of fishers had reached the elementary level, comprising 46% of the total respondents. A smaller percentage had graduated from high school or completed senior high school (9%), while no fishers were college graduates. Only three respondents belonged to the college level. Age was found to play a significant role in fishing, influencing experience, expertise, and physical strength. Older fishers were noted to possess extensive knowledge about fishing, including the species of fish they caught and the location of fish schools. Conversely, younger fishers demonstrated higher proficiency in their work due to their physical capabilities, minimizing the risk of injuries (Alvina & Clemente, 2022).

Furthermore, education levels among fishers had implications for their knowledge, practices, methods, and perceptions. However, it is worth noting that the impact of education on fishers' capabilities and resource management can be influenced by various factors. The study by Maddox (2007) suggests that education disadvantages can have a negative effect on people's access to resources, information, and their ability to manage and conserve marine resources. In summary, the demographic profile of fishers in the four barangays of Cawayan revealed variations in age and educational attainment. Age influenced fishing expertise and physical capabilities, while educational attainment had implications for knowledge, practices, and resource management among fishers.

Table 1: Demographic profile of the fishers in selected coastal barangays of Cawayan

Variable	Mahayahay N= 44		Divisoria N= 44		Recodo N=42		Begia N=44		Total N=174	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Age										
>20 years	0	0	3	7	0	0	0	0	3	2
21-40 years	29	66	15	34	15	36	25	57	84	48
41-50 years	7	16	16	36	18	43	10	23	51	29
51 years and above	8	18	10	23	9	21	9	20	36	21
Educational Attainment										
Elementary Grad.	18	41	12	27	7	16	16	38	53	30
Elementary Level	16	36	19	39	30	68	15	36	80	46
HS/SHS Grad.	3	7	6	14	1	2	5	12	15	9

Variable	Mahayahay N= 44		Divisoria N= 44		Recodo N=42		Begia N=44		Total N=174	
	F	%	F	%	F	%	F	%	F	%
HS/SHS Level	7	16	7	16	4	9	5	12	23	13
College Grad.	0	0	0	0	0	0	0	0	0	0
College Level	0	0	0	0	2	5	1	2	3	2

Fishing Background of the Fishers

The fishing background of fishers from four different areas or communities (Mahayahay, Divisoria, Recodo, and Begia) was examined, and the results are presented in Table 2. In terms of years in fishing, it was observed that the majority of fishers across all communities had been fishing for 6-15 years, with some having more than 16 years of experience. Only a small number of fishers had been fishing for 36 years and above. (Aning Kesuma Putri and Ayu Wulandari, 2020) showed that the variables of fishermen's experience and working hours had a significant effect on the variability of fishermen's income. Based on our interview, having more experienced fishers would allow for a greater variety of fishing techniques and strategies to be employed, resulting in a more successful and enjoyable fishing experience. It would also enhance knowledge of different fish species and their behavior, increasing the chances of success. Moreover, experienced fishers would be able to make better use of resources such as tides, currents, and weather forecasts to optimize their fishing opportunities.

Regarding annual income, the majority of fishers across most communities had an annual income of 30,000 and above, while some had an income of 10,000-29,000. The income of fishers is classified as poor (PIDS, 2018). A very small percentage of fishers had an annual income below 4,000. The income of fishers is influenced by various factors such as the ability to catch large quantities of fish at high market prices, the presence of regulations to control overfishing, demand for the caught products, and changes in the external environment including weather and shifts in human population and consumption patterns. In terms of membership in organizations, a significant majority of fishers across all communities were not members of any organization. Community-Based Organizations (CBOs) play a crucial role in promoting responsible and sustainable practices in the fishing industry. They increase awareness and participation of local stakeholders in fisheries management and work to build capacity within fishing communities. However, as seen in the table, most of the fishers from the four barangays were not involved in any organization. Lastly, in terms of government support received, most fishers across all communities reported receiving financial support or fishing gear from the local government. A small percentage received fishing vessels, seminars, or training, while some did not receive any support at all.

Table 2. Fishing background of the fishers

Variables	Mahayahay N=44		Divisoria N=44		Recodo N=42		Begia N=44		Total N=174	
	F	%	F	%	F	%	F	%	F	%
Years in Fishing										
0-5 years	1	2	10	23	7	17	4	10	22	13
6-15 years	16	36	12	27	19	45	9	20	56	32
16-25 years	16	36	12	27	7	17	8	18	43	25
26-30 years	5	11	6	14	2	5	7	16	20	11
31-35 years	5	11	0	0	1	2	4	9	10	6
36 years and above	1	2	4	9	6	14	12	27	23	13
Annual Income										
30,000 and above	37	84	29	66	27	64	37	84	130	75

Variables	Mahayahay N=44		Divisoria N=44		Recodo N=42		Begia N=44		Total N=174	
	F	%	F	%	F	%	F	%	F	%
10,000-29,000	7	16	15	30	13	31	7	16	42	24
5,000-9,000	0	0	0	0	2	5	0	0	2	1
Below 4,000	0	0	0	0	0	0	0	0	0	0
Are you a member of an organization?										
Yes	2	5	4	9	14	33	0	0	20	11
No	42	95	40	91	28	67	44	100	154	89
What kind of support did you get from the local government?										
Financial support	18	41	12	27	13	31	9	20	52	30
Fishing Vessels	15	34	0	0	0	0	0	0	15	9
Fishing gears	5	11	4	9	0	0	0	0	9	5
Seminars or trainings	5	11	0	0	0	0	0	0	5	3
None	1	3	28	63	29	69	35	80	93	53

Fishing Operation by the Fishers

Based on the results presented in Table 3, it can be observed that in the selected coastal barangay of Cawayan, some fishermen (23%) did not solely rely on catching marine species in the Cawayan area. They had to venture into other fishing areas where fish were more abundant and these areas were not yet occupied (Mahayahay: 9%, Divisoria: 14%, Recodo: 7%, Begia: 10%). The fishermen in the study expressed their belief that gear limits are an effective means to maintain fish catch. This viewpoint is supported by previous research conducted by Scott & Cardona (2022), which highlighted those changes in fishing gear configurations can significantly reduce fishing interactions, minimize injuries, and decrease mortality among non-target species. It is worth noting that some fishermen (32%) reported a lack of equipment and fishing methods that can potentially impact their catch.

Regarding boat ownership, a significant proportion of the fishermen (68%) did not own the boats they operated. Among those who did own boats, the majority (93%) used motorboats. When asked about their income from fishing, 72% of the respondents stated that it was just enough to cover their everyday expenses. Furthermore, a considerable number of fishermen (57%) did not have alternative sources of income when they were unable to go fishing due to bad weather. This indicates that their livelihoods were heavily reliant on fishing. The frequency of fishing was also influenced by weather conditions. Half of the fishermen in the selected barangay of Cawayan reported fishing for only 8-14 days per month. During bad weather, some fishermen resorted to other means of income generation, such as construction work (24%), farming (5%), tricycle driving (8%), or vending (2%), while a significant number (57%) had no alternative source of income. In conclusion, the results suggest that in the studied coastal barangay of Cawayan, fishermen faced challenges related to fishing areas, gear limitations, equipment availability, boat ownership, income sufficiency, and alternative income sources during adverse weather conditions. These findings highlight the need for further support and interventions to improve the livelihoods and sustainability of the fishing community in the area.

Table 3: Fishers Operation

Variables	Mahayahay (n=44)		Divisoria (n=44)		Recodo (n=42)		Begia (n=44)		Total (174)	
	F	%	F	%	F	%	F	%	F	%
Fishing area										
Cawayan area	35	80	30	68	35	83	34	77	134	77
Other areas	9	20	14	32	7	17	10	23	40	23

Variables	Mahayahay (n=44)		Divisoria (n=44)		Recodo (n=42)		Begia (n=44)		Total (174)	
	F	%	F	%	F	%	F	%	F	%
Gears used										
Net	8	18	43	98	30	71	34	77	115	65
Hook and line	16	36	0	0	0	0	10	23	26	15
Spear gun	19	43	4	9	12	29	0	0	35	20
Fishing method										
Trawl	1	2	0	0	0	0	32	73	33	19
Panlambay	1	2	14	32	0	0	0	0	15	9
Hulbot-hulbot	1	2	13	30	0	0	0	0	14	8
Compressor	35	80	1	2	1	2	0	0	37	21
Laya	1	2	1	2	29	69	0	0	31	18
Pamo	0	0	6	14	0	0	0	0	6	3
Pamasol	0	0	0	0	12	29	12	29	24	14
Pamusit	2	5	0	0	0	0	0	0	2	1
Pamalo	0	0	8	19	0	0	0	0	8	5
Pangitang	3	7	1	2	0	0	0	0	4	2
Do you believe gear limits are a good way to maintain fish catch?										
Completely agree	44	100	44	100	42	100	44	100	174	100
Agree	0	0	0	0	0	0	0	0	0	0
Disagree	0	0	0	0	0	0	0	0	0	0
Don't know	0	0	0	0	0	0	0	0	0	0
Do you think other fishers would support the idea of gear limits?										
Completely agree	16	36	12	27	14	33	9	20	51	29
Agree	18	41	25	57	21	48	20	45	84	48
Disagree	5	11	4	9	2	5	4	9	15	9
Don't know	5	11	3	7	5	11	11	25	24	14
Do you have your own boat that you operate?										
Yes	35	80	34	77	35	83	15	34	119	68
No	9	20	10	23	7	17	29	66	55	32
Is your income from fishing enough for your everyday expenses?										
Yes	32	73	30	68	36	86	28	64	126	72
No	12	27	14	32	6	14	16	36	48	28
What kind of boat do you use?										
Rowboat	0	0	0	0	1	2	10	23	11	6
Motorboat	43	98	44	100	41	100	34	77	162	93
Canoe	0	0	0	0	0	0	0	0	0	0
None	1	2	0	0	0	0	0	0	1	1
During bad weather, what are your alternative sources of income?										
Construction	11	25	17	39	4	10	10	22	42	24
Farming	0	0	2	5	2	5	5	11	9	5
Tricycle driver	5	11	7	16	2	5	0	0	14	8
Vendor	1	2	1	2	0	0	1	2	3	2
Other	0	0	3	9	2	5	1	2	6	4
None	27	61	14	32	32	76	27	61	100	57
Frequency of Fishing/ per month										
1-7 days	2	5	3	7	2	5	3	7	10	6

Variables	Mahayahay (n=44)		Divisoria (n=44)		Recodo (n=42)		Begia (n=44)		Total (174)	
	F	%	F	%	F	%	F	%	F	%
8-14 days	23	52	18	41	18	43	28	67	87	50
15 days and above	19	43	23	52	22	50	13	30	77	44

Species and volume of the catch of Marine Resources Caught by the Fishers

The results from Table 4 provide valuable insights into the marine species caught by fishers in different locations. The data, obtained from an unspecified study or survey, presents the fish catch in kilograms for various species across four fishing areas: Mahayahay, Divisoria, Recodo, and Begia. Among the recorded species, Aso-os, also known as Whiting (*Silago sihama*), had no recorded catch in Mahayahay, Divisoria, and Recodo. However, fishers in Begia caught 26 kilograms of Aso-os. Balo, commonly known as Needlefish (*Belonidae*), showed varying catch quantities across the areas, with 37 kilograms caught in Mahayahay, 245 kilograms in Divisoria, 50 kilograms in Recodo, and 85 kilograms in Begia. Short mackerel, or Buraw (*Rastrelliger brachysoma*), had catch quantities of 40 kilograms in Mahayahay, 21 kilograms in Divisoria, and 43 kilograms in Recodo, but no catch was recorded in Begia. Asian seabass, known as Bulgan (*Lates calcarifer*), was caught in smaller quantities, with 42 kilograms in Mahayahay, 8 kilograms in Divisoria, and no catch in Recodo and Begia. Ban-ban, a species not specified by its common name (*Hemiramphus far*), yielded a catch of 12 kilograms in Mahayahay, 58 kilograms in Divisoria, but no catch in Recodo and Begia. Banak, commonly known as Mullet (*Cephalus*), had no recorded catch in Mahayahay and Divisoria, but 10 kilograms were caught in Recodo, and no catch

was recorded in Begia. Pinspotted spinefoot, or Dangguit (*Siganus foscescens*), exhibited a higher catch, with 160 kilograms in Mahayahay, 36 kilograms in Divisoria, but no catch in Recodo and Begia. Daguldulan, a species of Ponyfish (*Leiognathus sp.*), had no recorded catch in Mahayahay, 45 kilograms in Divisoria, 10 kilograms in Recodo, and no catch in Begia. Bisugo, also known as Lagaw (*Nemipterus virgatus*), showed varying catch quantities across the areas, with 20 kilograms in Mahayahay, 21 kilograms in Divisoria, 33 kilograms in Recodo, and 50 kilograms in Begia. Lapu-lapu, a type of Grouper (*Epinephelinae*), had a catch of 27 kilograms in Mahayahay, no catch in Divisoria and Recodo, but 1 kilogram in Begia. Silay, known as Lattice monocle bream (*Scolopsis taenioptera*), had catch quantities of 13 kilograms in Mahayahay, 15 kilograms in Divisoria, and 44 kilograms in Begia, with no catch in Recodo. Yellowstrip scad, or Karabalyas (*Lutjanus lutjanus*), showed a catch of 17 kilograms in Mahayahay, 72 kilograms in Divisoria, 7 kilograms in Begia, and no catch in Recodo. The species Kirus (big) and Kirus (small), which were not specified by their common names (*Litrinus miniatus*), had varying catch quantities across the areas. Fishers caught 40 kilograms of Kirus (big) in Mahayahay, 140 kilograms in Divisoria, and no catch in Recodo and Begia. For Kirus (small), 60 kilograms were caught in Mahayahay, 130 kilograms in Divisoria, and no catch in Recodo and Begia.

Table 4: Marine species and volume of the fish catch of the selected barangays of Cawayan

	FISH SPECIES		FISH CATCH (kg)			
Local name	Common name	Scientific name	Mahayahay	Divisoria	Recodo	Begia
Aso-os	Whiting	*Silago sihama*	0	0	0	26
Balo	Needlefish	*Belonidae*	37	245	50	85
Buraw	Short mackerel	*Rastrelliger brachysoma*	40	21	43	0

	FISH SPECIES		FISH CATCH (kg)			
Local name	**Common name**	**Scientific name**	**Mahayahay**	**Divisoria**	**Recodo**	**Begia**
Bulgan	Asian sea-bass	*Lates calcarifer*	42	8	0	0
Ban-ban	Gold stripe Sardinella	*Hemiramphus far*	12	58	0	0
Banak	Mullet fish	*Mugilidae*	0	0	10	0
Dangguit	Pinspotted spinefoot	*Siganus foscescens*	160	36	0	0
Daguldulan	Ponyfish	*Leiognathus sp.*	0	45	10	0
Lagaw	Bisugo	*Nemipterus*	20	21	33	50
Lapu-lapu	Grouper	*Epinephelinae*	27	0	1	0
Silay	Lattice monocle bream	*Scolopsis taeniop-tera*	13	15	0	44
Karabalyas	Yellowstrip scad	*Lutjanus lutjanus*	17	72	0	7
Kirus (big)	Linggero	*Litrinus miniatus*	40	140	0	0
Kirus (small)	Linggero	*Litrinus miniatus*	60	130	0	0
Mamsa	Giant tre-valley	*Selar crumenop-thalmus*	4	11	2	10
Matambaka	Oxeye scad	*Selar boops*	5	8	10	0
Pagi	Stingray	*Myliobatoilei*	52	14	0	0
Pandawan	Dolphin fish	*Corypheana sp.*	15	0	70	40
Pasayan	Pink shrimp	*Farfantepenaeus duorarum*	5	44	0	188
Pungko-pungko	Octopus	*Octopus vulgaris*	0	27	0	50
Pusit	Squid	*Loligo forbesii*	23	135	1	77
Pating	Shark	*Selachimorpha*	50	11	40	21
Redsal	Goldband goatfish	*Upeneus moliccensis*	23	65		14
Sap-sap	Slipmouth fish	*Leiognathus brevi-rostris*	0	25	0	0
Salay-salay	Yellow-stripe scad	*Selaroides leptolepis*	0	0	21	0
Tangigue	Narrow barred	*Scomberomorus commerson*	0	18	317	0
Tulingan	Mackerel tuna	*Euthynnus affinis*	0	0	1452	0
Malasugi	Sailfish	*Istiophorus platyp-terus*	0	0	110	0
Seaweeds species						
Latu	Sea grapes	*Caulerpa lentillitera*	1	0	0	0
Goso	Local sea-weed	*Euchuema al-varezii*	1	0	0	0
Buwak saang	Sea moss	*Gracilaria*	2	2	0	0

	FISH SPECIES		FISH CATCH (kg)			
Local name	**Common name**	**Scientific name**	**Mahayahay**	**Divisoria**	**Recodo**	**Begia**
Seashells species						
Tikab	Scallop	*Placopectin magbellanicus*	690	30	0	0
Binga	Baler	*Melo Melo amphora*	114	35	0	0
Tikpay	Pen Shell	*Pinna rudis*	6	0	0	0
Garang-garang	Horned helmet	*Cassis cornuta*	46	2	0	0
Litub	Blood clam	*Arca ventricosa*	15	0	0	0
Crabs						
Lambay	Blue crabs	*Portunus pelagicus*	235	118	0	69

Other species recorded in the table include Mamsa (Giant trevalley, Selar crumenopthalmus), Matambaka (Oxeye scad, Selar boops), Pagi (Stringray, Myliobatoilei), Pandawan (Dolphin fish, Corypheana sp.), Pasayan (Pink shrimp, Farfantepenaeus duorarum), Pungko-pungko (Octopus, Octopada), Pusit (Squid, Loligo forbesii), Pating (Shark, Selachimorpha), Redsal (Goldband goatfish, Upeneus moliccensis), Sap-sap (Slipmouth fish, Leiognathus brevirostris), Salay-salay (Yellowstripe scad, Selaroides leptolepis), Tangigue (Narrow barred, Scomberomorus commerson), Tulingan (Mackerel tuna, Euthynnus affinis), and Malasugi (Sailfish, Istiophorus platypterus). The table also includes information on seaweed species, such as Latu (Sea grapes, Caulerpa lentillitera) and Goso (Local seaweed, Euchuema), as well as seashells species, including Tikab (Scallop, Placopectin magbellanicus), Binga (Mother of pearl, Nacre), Tikpay (Scallop, Pactin sp.), Garang-garang (Horned helmet, Cassis cornuta), and Litub (Blood clam, Arca ventricosa). Lastly, the table lists Lambay (Blue crabs, Portunus pelagicus) under the crab's category.

Table 5: Price (Php) of marine species caught the fishers per kilo

Local Name of Caught Marine Species (kg)	**Prices per kilo (Php)**	**Mahayahay**		**Divisoria**		**Recodo**		**Begia**	
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Fish									
Buraw	**200.00**	**6**		**7**		**7**		**0**	
3-7		4	67	6	86	3	50	0	0
7.1-11		1	17	1	14	3	50	0	0
11.1-15		0	0	0	0	0	0	0	0
15.1-19		0	0	0	0	0	0	0	0
19.1-23		1	17	0	0	0	0	0	0
Turingan	**150.00**	**0**		**1**		**24**		**0**	
3-170		0	0	1	100	22	92	0	0
170.1-337		0	0	0	0	0	0	0	0
337.1-504		0	0	0	0	2	8	0	0
Tangigue	**200.00**	**0**		**4**		**23**		**0**	
1-10		0	0	4	100	16	70	0	0
10.1-20		0	0	0	0	2	9	0	0
20.1-30		0	0	0	0	1	4	0	0
30.1-40		0	0	0	0	2	9	0	0

Local Name of Caught Marine Species (kg)	Prices per kilo (Php)	Mahayahay		Divisoria		Recodo		Begia	
		F	%	F	%	F	%	F	%
40.1-50		0	0	0	0	1	4	0	0
Malasugi	**180.00**	**0**		**0**		**5**		**0**	
20-40		0	0	0	0	4	80	0	0
40.1-60		0	0	0	0	0	0	0	0
60.1-80		0	0	0	0	1	20	0	0
Pating	**50.00**	**12**		**3**		**2**		**0**	
1-5		10	83	3	100	0	0	0	0
5.1-10		1	8	0	0	0	0	0	0
10.1-15		0	0	0	0	0	0	0	0
15.1-20		1	8	0	0	2	0	0	0
Dagundulan	**70.00**	**0**		**2**		**3**		**0**	
5-20		0	0	1	50	3	100	0	0
20.1-40		0	0	1	50	0	0	0	0
Mamsa	**150.00**	**3**		**4**		**13**		**1**	
1-5		3	100	4	100	4	31	0	0
5.1-10		0	0	0	0	7	54	1	100
10.1-15		0	0	0	0	1	8	0	0
Lagaw	**150.00**	**0**		**12**		**7**		**0**	
1-2		0	0	10	83	0	0	0	0
2.1-3		0	0	1	8	1	0	0	0
3.1-4		0	0	0	0	0	0	0	0
4.1-5		0	0	1	8	5	0	0	0
Salay-salay	**80.00**	**0**		**0**		**7**		**0**	
3		0	0	0	0	3	43	0	0
4		0	0	0	0	4	57	0	0
Balo	**100.00**	**3**		**13**		**4**		**5**	
2-8		1	33	4	31	2	50	1	20
8.1-14		0	0	3	23	1	25	2	40
14.1-20		1	33	2	15	1	25	0	0
20.1-26		1	33	0	0	0	0	0	0
26.1-32		0	0	4	31	0	0	2	40
Banak	**30.00**	**0**		**0**		**1**		**0**	
1		0	0	0	0	1	100	0	0
Pusit	**250.00**	**9**		**13**		**1**		**9**	
1-10		9	100	10	77	1	100	8	89
10.1-20		0	0	2	15	0	0	1	11
20.1-30		0	0	1	8	0	0	0	0
Pandawan	**150.00**	**0**		**2**		**4**		**0**	
3-5		0	0	2	100	0	0	0	0
5.1-10		0	0	0	0	1	25	0	0
10.1-15		0	0	0	0	0	0	0	0
15.1-20		0	0	0	0	3	75	0	0
Danggit	**100.00**	**30**		**9**		**1**		**0**	
1-3		16	53	9	100	1	100	0	0
3.1-6		7	23	0	0	0	0	0	0
6.1-9		0	0	0	0	0	0	0	0
9.1-12		6	20	0	0	0	0	0	0

Local Name of Caught Marine Species (kg)	Prices per kilo (Php)	Mahayahay		Divisoria		Recodo		Begia	
		F	%	F	%	F	%	F	%
12.1-15		1	3	0	0	0	0	0	0
Redsal	**100.00**	**4**		**11**		**0**		**4**	
1-5		3	75	0	0	0	0	4	100
5.1-10		0	0	11	100	0	0	0	0
10.1-15		0	0	0	0	0	0	0	0
15.1-20		1	25	0	0	0	0	0	0
Karabalyas	**50.00**	**3**		**8**		**0**		**2**	
2-8		2	67	5	63	0	0	2	100
8.1-14		1	23	1	13	0	0	0	0
14.1-20				2	25	0	0	0	0
Tingag	**80.00**	**2**		**1**		**0**		**1**	
1-3		2	100	1	100	0	0	0	0
3.1-5		0	0		0	0	0	1	100
Bangkigan	**400.00**	**0**		**0**		**0**		**15**	
2-6		0	0	0	0	0	0	6	40
6.1-10		0	0	0	0	0	0	6	40
10.1-14		0	0	0	0	0	0	0	0
14.1-18		0	0	0	0	0	0	3	2
Aso-os	**100.00**	**0**		**0**		**0**		**12**	
1-2		0	0	0	0	0	0	8	67
2.1-3		0	0	0	0	0	0	4	33
Silay	**50.00**	**2**		**1**		**0**		**14**	
2-4		1	50	0	0	0	0	10	71
4.1-6		0	0	0	0	0	0	4	29
6.1-10		1	50	0	0	0	0	0	0
10.1-14		0	0	0	0	0	0	0	0
14.1-18		0	0	1	100	0	0	0	0
Pasayan	**150.00**	**3**		**0**		**0**		**30**	
2-4		3	100	0	0	0	0	8	27
4.1-6		0	0	0	0	0	0	9	30
6.1-8		0	0	0	0	0	0	6	20
8.1-10		0	0	0	0	0	0	7	23
Matambaka	**200.00**	**3**		**1**		**1**		**0**	
1-4		3	100	0	0	0	0	0	0
4.1-7		0	0	0	0	0	0	0	0
7.1-10		0	0	1	0	1	100	0	0
Badlon	**300.00**	**0**		**1**		**0**			
10		0	0	1	100	0	0	0	0
Kiros(b)	**150.00**	**1**		**3**		**0**		**0**	
30-40		1	100	1	33	0	0	0	0
40.1-50		0	0	1	33	0	0	0	0
50.1-60		0	0	1	33	0	0	0	0
Kiros (S)	**100.00**	**1**		**3**		**0**		**0**	
30-40		0	0	1	33	0	0	0	0
40.1-50		0	0	2	67	0	0	0	0
50.1-60		1	100	0	0	0	0	0	0
Lapu-lapu	**200.00**	**11**		**1**		**1**		**0**	

Local Name of Caught Marine Species (kg)	Prices per kilo (Php)	Mahayahay		Divisoria		Recodo		Begia	
		F	%	F	%	F	%	F	%
1-3		10	91	1	100	1	100	0	0
3.1-5		1	9	0	0	0	0	0	0
Pungko-pungko	**60.00**	**0**		**7**		**0**		**17**	
1-3		0	0	2	29	0	0	12	71
3.1-5		0	0	5	71	0	0	5	29
Ban-ban	**100.00**	**2**		**3**		**1**		**1**	
2-5		1	50	2	67	0	0	0	1
5.1-8		0	0	0	0	1	100	1	100
8.1-11		1	50	1	33	0	0	0	0
Sap-sap	**60.00**	**1**		**5**		**0**		**0**	
5-8		0	0	3	60	0	0	0	0
8.1-11		1	100	2	40	0	0	0	0
SEASHELLS									
Binga	**50.00**	**25**		**11**		**0**		**0**	
1-5		23	92	11	100	0	0	0	0
5.1-9		0	0	0	0	0	0	0	0
9.1-13		1	4	0	0	0	0	0	0
13.1-17		0	0	0	0	0	0	0	0
17.1-21		1	4	0	0	0	0	0	0
Garang-garang	**10.00**	**11**		**1**		**0**		**0**	
1-15		10	91	1	100	0	0	0	0
15.1-25		1	9	0	0	0	0	0	0
Tikab	**40.00**	**16**		**2**		**0**		**0**	
1-40		10	63	2	100	0	0	0	0
40.1-80		3	19	0	0	0	0	0	0
80.1-120		2	13	0	0	0	0	0	0
120.1-160		0	0	0	0	0	0	0	0
160-200		1	7	0	0	0	0	0	0
Tikpay	**50.00**	**7**		**0**		**0**		**0**	
1-3		4	57	0	0	0	0	0	0
3.1-5		3	43	0	0	0	0	0	0
CRAB									
Lambay	**140.00**	**16**		**10**		**0**		**26**	
1-7		10	63	3	30	0	0	26	100
7.1-13		3	19	2	20	0	0	0	0
13.1-19		2	13	4	40	0	0	0	0
19.1-25		1	6	1	10	0	0	0	0
SEAWEEDS									
Goso	**20.00**	**1**		**0**		**0**		**0**	
1		1	100	0	0	0	0	0	0
Lato	**50.00**	**1**		**0**		**0**		**0**	
1		1	100	0	0	0	0	0	0
Buwak saang	**20.00**	**0**		**1**		**0**		**0**	
2		0	0	1	100	0	0	0	0

The results presented in Table 5 show the species and volume of the catch of marine resources by the fishers. The data includes the prices per kilogram in Philippine Pesos (Php) and the catch distribution among different fishing areas. For the fish species "Buraw," the price per kilogram was Php 200. The catch distribution in Mahayahay, Divisoria, Recodo, and Begia fishing areas was 6%, 7%, 7%, and 0% respectively. The catch volume for different size ranges varied, with the highest catch observed in the 3-7 kilogram range (4 fish, 67%). The species "Turingan" had a price per kilogram of Php 150. The catch distribution showed no catch in Mahayahay but significant catches in Divisoria (1 fish, 100%) and Recodo (24 fish, 92%) fishing areas. The catch volume was highest in the 3-170 kilogram range (22 fish, 92%). Similarly, the species "Tangigue" had a price per kilogram of Php 200. The catch distribution showed no catch in Mahayahay but significant catches in Divisoria (4 fish, 100%) and Recodo (23 fish, 70%) fishing areas. The catch volume was highest in the 1-10 kilogram range (4 fish, 100%). For "Malasugi," the price per kilogram was Php 180. There were no catches reported in Mahayahay, Divisoria, and Begia fishing areas. However, there were 5 catches (80%) in the Recodo fishing area, all falling within the 20-40 kilogram range. The species "Pating" had a price per kilogram of Php 50. The catch distribution showed significant catches in Mahayahay (12 fish, 83%) and Divisoria (3 fish, 100%)

fishing areas. No catches were reported in Recodo and Begia areas. The catch volume was highest in the 1-5 kilogram range (10 fish, 83%).

The table provides similar information for other fish species, including Dagundulan, Mamsa, Lagaw, Salay-salay, Balo, Pusit, Pandawan, Dangguit, Redsal, Karabalyas, Tingag, Bangkigan, Aso-os, Silay, Pasayan, Matambaka, Badlon, Kiros (b), Kiros (S), Lapu-lapu, Pungko-pungko, Ban-ban, Sap-sap, Binga, Garang-garang, Tikab, and Tikpay. The catch distribution and volume vary for each species and fishing area. It is important to note that these results are based on the data collected and analyzed by the researchers. The prices and catch volumes presented here provide valuable insights into the fishing activities and resource availability in the studied areas.

The market of Marine Resources caught by the Fishers

The results of the survey presented in Table 6 indicate that the majority of fishers in the Mahayahay, Divisoria, Recodo, and Begia regions engaged in selling their caught fish and shellfish to local buyers (Mahayahay: F=44, 100%; Divisoria: F=44, 100%; Recodo: F=30, 71%; Begia: F=44, 100%). However, a smaller number of respondents (12 out of 42) opted for direct retail or expert procedures to sell their products.

Table 6: Market of Marine Resources Caught by the Fishers

Variables	Mahayahay (n=44)		Divisoria (n-44)		Recodo (n=42)		Begia (n=44)	
	F	%	F	%	F	%	F	%
Marketing of Caught Fish Shellfish								
Sold to Local Buyer	44	100	44	100	30	71	44	100
Direct Retail	0	0	0	0	12	29	0	0

Fishers chose to market their caught fish and shellfish to local buyers primarily because it provided them with direct access to the local market, which allowed them to obtain higher prices for their seafood products. Additionally, selling to local buyers facilitated the establishment of relationships with repeat customers and provided the fishers with more autonomy

and control over the marketing and selling of their products. Alternatively, fishers may decide to market their products directly to retail customers, which enables them to have a significant role in the supply chain. By engaging in direct retail, fishers can have direct control over the pricing and presentation of their products, leading to higher profits and increased brand

recognition. Moreover, this approach allows them to swiftly adapt to market changes and respond to consumer trends.

Fishing Perception by the Fishers

The study examined the perception of fishers regarding illegal fishing activities in different villages. The results, presented in Table 7, indicated that 91% of the fishers from Mahayahay reported engaging in illegal fishing, compared to 43% from Divisoria and 12% from Recodo. A total of 174 fishers were surveyed. Regarding the awareness of legal restrictions on illegal fishing in their respective villages, 89% of fishers from Mahayahay, 82% from Divisoria, and 74% from Recodo acknowledged such restrictions. Furthermore, 66% of fishers from

Mahayahay, 55% from Divisoria, and 60% from Recodo were aware of national or local ordinances that prohibit illegal fishing in their areas.

In terms of collaboration and efforts to combat illegal fishing, only 9% of fishers from Mahayahay, 14% from Divisoria, and 7% from Recodo reported taking part in such activities. The majority of fishers (86%) did not collaborate or participate in efforts to fight illegal fishing. Regarding the fishers' attitudes towards witnessing illegal fishing methods, 95% of fishers from Mahayahay, 89% from Divisoria, and 93% from Recodo believed they should keep silent if they observe other fishermen engaging in illegal fishing practices.

Table 7: Fishers Perception

Variables	Mahayahay (n=44)		Divisoria (n=44)		Recodo (n=42)		Begia (n=44)		Total (n=174)	
	F	%	F	%	F	%	F	%	F	%
A. Have you ever engaged in illegal fishing?										
Yes	40	91	19	43	5	12	44	100	108	62
No	4	9	25	47	37	88	0	0	66	38
B. Are you aware of any legal restrictions on illegal fishing in your village?										
Yes	39	89	36	82	31	74	38	86	144	83
No	5	11	8	18	11	26	6	14	30	17
C. Are there national or local ordinances that restrict illegal fishing in your areas?										
Yes	29	66	24	55	25	60	31	70	109	63
No	15	34	20	45	17	40	13	30	55	37
D. Do you collaborate or take part in the effort to fight illegal fishing?										
Yes	4	9	6	14	3	7	11	25	24	14
No	40	91	38	86	41	93	33	75	152	86
E. If you see some fishermen using illegal fishing methods, should you keep silent?										
Yes	42	95	39	89	39	93	37	84	157	90
No	2	5	5	11	3	7	7	16	17	10

The study's findings suggest that a significant portion of fishers, especially in Mahayahay, have engaged in illegal fishing activities. Although some fishers are aware of legal restrictions and ordinances against illegal fishing, the majority do not actively collaborate or report such activities. This lack of action may contribute to the degradation of fish populations, habitats, and overall marine resources. It is crucial to address illegal fishing and encourage fishers to report such activities to the

appropriate authorities to protect the environment and ensure sustainable fishing practices.

Conclusion and Recommendations

The study focused on fishers in coastal barangays (villages) of Cawayan and examined their characteristics and challenges. The fishers varied in age and educational attainment, with older fishers having extensive knowledge and younger ones being physically capable. However, some fishers lacked the necessary equip-

ment and knowledge of effective fishing methods. Due to limited resources in their local fishing areas, fishers often had to explore other fishing grounds. Although the average annual income was above 30,000, poverty remained an issue among the fishers. To enhance the resilience of the fishing communities, several factors were identified as important. These included boat ownerships, income diversification (engaging in other livelihood activities alongside fishing), and the presence of community-based organizations that could provide support and collective decision-making.

Based on the findings, the study proposed several recommendations. These included investing in education and training programs for fishers to improve their skills and knowledge, ensuring better access to equipment and resources, promoting alternative fishing grounds to reduce overfishing pressure, and supporting sustainable fishing practices.

Acknowledgement

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