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Climate Change Adaptation Impact of Indigenous Fishing Techniques in Selected Coastal Barangays of Partido Area

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ABSTRACT

Most of the Bicolanos living in the coastal are dependent on marine fisheries resources for their livelihoods and source of dietary protein. The purpose of this study was to investigate the impact of indigenous fishing techniques on climate change adaptation in the coastal Barangay of Partido Area of Camarines Sur, Philippines. Traditional fishing techniques or methods still exist in the coastal areas barangays of Partido Area as an ancient practice that has been an essential part of human life during the past decade. Different peoples in these coastal barangays developed different fishing techniques to survive in their environment. A constant flooding in the coastal area has affected the fishers in using their Indigenous fishing gears. The coastal communities are put at higher risk in endeavoring into the sea as climate change causes hazard to the area. Hence, rural fisher folks need to be informed regarding climate. The government agencies such as: the BFAR, PDA and SUCs must provide technical assistance to the municipalities of Partido Area on the establishment of fish sanctuary and marine reserve used weather information and should apply and implement of similar climate mitigation and adaptive strategies as potential solution to reduce current and future vulnerability of fisher folks in coastal barangays.

KEYWORD: Climate change adaptation, indigenous fishing technique, fisher folks, traditional methods

1. INTRODUCTION

The Philippines lies along the western rim of the Pacific Ring of Fire, a belt of active volcanoes and major earthquake faults, and the Pacific typhoon belt. It has a total discontinuous coastline of 32,400 kilometers, the longest in the world and is especially vulnerable to the adverse impacts of climate change. It is one of the world's most natural disaster-prone countries due to a combination of high incidence typhoons, floods, landslides, droughts, volcanoes, earthquakes and the country's considerable vulnerability to these hazards. (Rincón and Virtucio, 2008 cited by Bigueja et.al.,2022) [1,2].

The Philippines is third in the ranking of vulnerability to climate change risks among 67 developed, emerging and frontier market countries, and is particularly very sensitive to extreme weather events in terms of people affected and economic costs (Paun, et. sl., 2018[3]. Climate change has been considered particularly important for fishing nations (Kelleher, et al., 2009; Barange, et al. 2014) [4,5] but discussion of climate change and impact on fisheries is also a key issue for the Philippines (Santos et al., 2011; Geronimo, 2018) [6,7].

These changes may cause not only loss of productivity, but also economic shock on the nation's economy. Since climate change is expected to have different consequences, impacts can be related to vulnerability in countries heavily dependent on fishery, in view of the important contribution of these sectors to employment, supply, income and nutrition Vannuccini, et al., 2018) [8]. The Philippines is actually vulnerable to the impacts of climate change on fisheries and it can lead to economic shock on the nation's economy. Among fishing nations, Philippines is one of the most vulnerable countries to climate change (Baldjeck, et al., 2010; FAO, 2016) [9].

Climate change's impact on the Philippines is most often associated with extreme weather disturbances such as typhoons and floods, which, in turn, affect many other sectors of economic life. With 50.3 percent of its total area and 81.3 percent of the population vulnerable to natural disasters, the Philippines is considered a natural disaster hot-spot. About 85.2 percent of its US$86 billion annual GDP is endangered as it is located in areas of risk (World Bank 2008).

The top ten provinces affected by such events are: Albay, Pampanga, Ifugao, Sorsogon, Biliran, Rizal, Northern Samar, Cavite, Masbate, and Laguna. In general, Central Luzon and the Bicol regions rank high to very-high on the risk scale {Bigueja et.al.,2022) [2].

Anticamara and Go (2017) [10] Climate change may also lead to substantial damage of insular habitats due to sea-level rise (Bellard et al. 2014) [11]. Hence, alternative livelihoods to offset such vulnerabilities should be addressed by onward strategies (Jacinto et al. 2015) [12]. The role of government and different stakeholders has enhanced support for fisheries in adapting to climate change (Miao 2018) [13]. In fact, adapting to climate change by integrating governance (Rizal, A. and Anna, Z. 2018) [14] and the other community actors is essential in alleviating its impacts (Macusi et al. 2015) [15].

The people of the Philippines, known as Filipinos, are dependent on marine fisheries resources for their livelihoods and source of dietary protein. The Philippines, as the 6th top fish producing country in the world, 9th in aquaculture, and 3rd in marine plants (BFAR, 2010) [16], embraces rich fishing grounds teeming with fisheries resources that supply food to the whole country. Fish and fishery products provide about 70% of the protein requirements of about 1.6 million Filipinos. Being an archipelagic country with over 2.2 million km2 of highly productive seas, fishing has been a major source of livelihood for almost 70% of communities located in coastal areas. The fisheries sector is therefore vital to the Philippine economy providing employment and income especially to rural areas and coastal communities. It was known in 2009, that the country's fisheries sector employed a total of 1,614,368 fishing operators nationwide of which the municipal fisheries sector accounted for the majority (85.0%) while the commercial and aquaculture sectors only accounted for 1.0% and 14.0% of the operators, respectively. The fisheries sector also contributed to approximately 2.2% (170.3 billion USD) to the country's GDP and export earnings of about 452 million USD (BFAR, 2009) [17].

Fishing in Partido, Camarines Sur, Philippines is a major source of livelihood for Partidonians living in coastal villages. It is one of the most vital economic activities that has fed and provided the needs of Bicolanos. The most common fishing techniques used by the fisher folks living in this were hand-gathering, spearfishing, netting, angling and trapping. These techniques are Indigenous Fishing Techniques and relatively low techniques approaches to catch fish. The onset of climate change most of the Partidonians fisher folks find difficulties catching fishes which affect their way of living. Hence this study was conducted to assess the impact on climate change adaptation of Indigenous Fishing Techniques in Selected Partido Area.

2. METHODOLOGY

2.1 Study and Extension Area

This study was carried out in the on selected barangay from five (5) municipalities in Partido Area namely; Lagonoy, San Jose, Tigaon, Sangay, and Presentacion, Camarines Sur, Philippines. These municipalities are selected because they use Indigenous Fishing Techniques in fishing.

2.2 Procedure

This study employed mixed methods in data gathering and analysis to assess the effectiveness and limits of local climate change adaptation. As explained by Johnson et al. (2007)[18], "Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration". The methods used in this study included reconnaissance survey, focus group discussions (FGDs), key informant interviews (KIIs), household survey and percentage techniques, as well as collection of primary, secondary data and analysis of climate change.

2.3 Research Design

The study applied the systematic review methods to collect data in identifying the characteristics of fisher folks using traditional fishing methods, the existing indigenous or traditional fishing techniques and perceptions and local adaptation strategies on climate change in coastal selected barangays in Partido Area. To support the information obtained from FGD, key informant interviews were conducted. Key informants included the Barangay Captains, some LGU representatives and fisher folks.

The stakeholder's perspectives are important in the triangulation process where the consistency of impacts and adaptation strategies from the households and community will be checked in terms of the corresponding programs the local government units (LGUs) are providing to the community.

2.4 Data Analysis

The researchers used Microsoft Excel for purposes of data analysis. All the completed test questions and questionnaires were first examined for completeness and consistency. Interviews were recorded.

3. RESULTS AND FINDINGS

3.1. Profile Fisher folks in Selected Partido Area of Camarines Sur, Philippines according to Age, Sex, Civil Status and Educational Qualification

TABLE 1. A Profile of Fisher Folks According to Age, Sex, Civil Status and Educational Qualification (N=80)

Age	**Frequency**	**Percentage**
Below 20	10	12.50%
21-30	20	25.00%
31-40	31	38.75%
41-50	10	12.50%
51 above	9	11.25%
Total	80	100.00%
Sex		
Male	75	93.75%
Female	5	6.25%
Total	**80**	**100.00**
Civil Status		
Single	20	25.00%
Married	42	52.50%
Widow	15	22.505
Separated	10	12.50%
Total	**80**	**100.00**%
Educational Qualification		
Elementary Graduate	26	32.50%
High School Graduate	46	57.50%
College Undergraduate	12	15.00%
College Undergraduate	6	7.50%
Total	**80**	**100.00**%

Table 1.1 reveals that out of two eighty (80) respondents 93.75% of them were male and 6.25% were female. This finding is related to the finding of Bigueja, et. al., (2021)[19] that most of the fisher's folk fishing in the river is majority of fisher folks are males which shows that fishing is not only a job of men but also for women. As to the age it shows that majority of the age ranges from 31-40 years old with percentage of 38.75% and least is ranges to 51 years old. It was noted too that most of the fisher folks marriage with the percentage of 52.50%. In terms of educational attainment majority were at the High School graduate (57.50%) and the 7.50% of the respondent is College Graduate. This result different from study of Mercado, J.O. and Mercado, R. A., (2016) [20] on Analysis of Socioeconomic Profile of Rural Fishers in Northern Part of Surigao Del Sur, Philippines which the majority the respondent age of 41 yrs. and in terms of educational attainment majority were at the elementary level or elementary graduate (66.86%) and the 3.57% of the respondent has no education at all. This differences may be due to the location and stability of economic conditions of the fisher folks.

TABLE 1b. Profile of Fisher Folks on Economic Activity (N=80)

Main Economic Activity	**Frequency**	**Percentage**
Fishing	54	67.50%
Farming	22	27.50%
Petty Trading	**4**	5.00%
Civil Servant	10	10.00%
Total	**80**	**100.00**%
How many times they go fishing/year?		
1-20	10	10.00%
21-50	26	32.25%
51-100	31	38.75%
More than 100	23	28.75%
Total	80	100.00%
Fishing Experiences		
1-10 years	20	25.00%
11-20 years	25	31.25%
21-30 years	26	32.50%
Above 30 years	10	12.50%
Total	**80**	**100.00**

Table 1.b shows the main economic activity, fishing was the topmost with 54 or 67.50 percent; followed by Farmers with 22 or 27.50 percent; while the lowest was Petty Trading with 4 or 5.00 percent. Results implied that Fishing is the most active activity particularly in the six (6) selected barangays in Partido because these are subsistence-based economies which provide food and livelihoods for these coastal communities. The fisherman lives beside the rivers, lakes and nearby ocean.

In terms of the number of times they go fishing, (51 -100) times got the topmost with 38.75 percent; followed by (21-50 times); while the lowest was (1-20) times with 10.00 percent. This means that the highest rating showed that Fishing is an important economic activity which provides food from the sea and thereby creates employment not only for the fisher folks but also for those who operate in the entire chain. Based on the interview, small-scale fisher folks confirmed that their life has been threatened by rapid commercialization of the Lagonoy Gulf water. These results implied that these forces had a greater impact on the reduction of the standard of living of a certain family. Though they went fishing hundred times in a year still they are insufficient with what they need for their own family with more than six (6) members in the household. They considered themselves poor.

Furthermore, climate change has also a greater effect on the fisher folks in this area. Suh, D. and Pomeroy, R., (2020) [21] stated that the climate change impacts on marine capture fisheries in the Philippines is projected to cause a decrease by about 9% of fisheries GDP with the mitigation scenario and about 18% of GDP with the extreme scenario up to 2060, compared to the baseline scenario. This climate impact results in income reduction by as much as 0.36% for urban households and 0.38% for rural households in the Philippine economy. In addition, urban-rural income disparity increases because loss for rural households is slightly higher than that of urban households. Climate change is one of the underlying causes of decrease in production in the marine capture fisheries sector, and the impact of climate change on marine capture fisheries sector is substantial since production is a big part of the economy. In the Philippines, marine capture is currently dominated by roundscad, big-eyed scad, anchovy, Indian oil sardines, Indian mackerel, threadfin bream and tuna species (PSA, 2017a) [22].

3.2 Species of fish caught during fishing

TABLE 2. Fish Species Caught in Selected Barangay of Six Towns in Partido Area

What species do they fish for?	Frequency	Percentage
Bass (Large mouth, small, mouth, white, yellow hybrid & striped)	20	6.25
Catfish	10	12.5
Pike (Musky)	23	28.75
Panfish	15	18.75
Carp	12	15.00
Striped Bash/ blue fish	34	42.50
Snook	18	22.50
Tout	12	15.00
Tarpoon	18	22.50
Weak fish / Sea Trout	35	43.75
Tuna and tuna like fish	63	78.75

In terms of species of fish caught in the area, the highest were tuna and tuna like fish (Pundahan, Malasugi, Tangigi, bangkulis, Burawon and many others) with 63 or 78.75 percent; followed by Sea Trout with 35 or 43.75; while the least species they fish for was Catfish with 10 or 12.50 percent. However, based on the interview of the respondents the species being caught depends on the season and best weather condition. According to the respondents from the six (6) barangays early morning; late morning and afternoon to dusk starting from 6:00 a.m to 9:00 a.m. and 9:00 to 1:00 pm; 1:00 to 5pm respectively; is the best time to fish. Many expert fisher folks believe that fish move more when the pressure is changing due to barometric pressure. Since Hand line is one of the major indigenous fishing methods used by the fisher's folk, tuna and tuna like are common fish caught in this area (Table 3). This finding supports the observation of Olaño, V. L. et.at, (2017) [23] which mentioned that Hand line is the most commonly used passive gear designed to catch tuna and other large pelagic species in the gulf. However, most tuna handliners use improvised hooks made from welding rod and firm wires. In addition, the said gear also catches genera of large pelagics such as malasugi (Istiophorus, Makaira, Istiompax) and lamadang/dorado (Coryphaena).

3.3 Traditional or Indigenous Fishing Methods used by Fishers in Fishing

TABLE 3. Traditional or Indigenous Fishing Methods used by Fishers in Selected Barangay Partido Area

Attributes							Total	Percentage
	A	B	C	D	E	F		
1.Hand line	11	8	9	10	12	2	62	77.50
2.Spear gun	9	5	10	12	9	10	55	68.75
3.Spear hand	10	9	9	6	8	9	51	63.75
4.Drop line	8	12	11	10	10	8	59	73.75
5.Towline	6	10	8	6	11	11	49	61.25
6.Dive goggles /Pana	10	8	9	11	9	7	54	67.50
7.Gill net	10	12	10	8	8	8	56	70.00
8.UW Torch	7	12	11	10	7	10	57	71.25
9.Wading net	13	8	5	12	13	12	63	78.75
10. Hook & line (og-og)	8	11	6	8	10	1	55	68.755

Table 3 presented the Existing Indigenous or Traditional Fishing Methods or Techniques as a means of livelihood in Selected Barangay in Partido Area. Among the ten (10) traditional fishing techniques, ***wading net*** got the highest percentage of 78.75 percent; followed by ***hand line*** Rank 2 with a percentage of 77.50; while the lowest method used by fisher folks was ***tow line***; Rank 10 with a percentage of 61.25. These results support the findings of Olaño, V. L. et.at, (2017) [23] that in Lagonoy Gulf, Philippines handling contributed the bulk of production (43%), followed by gillnet (22%), and other municipal gears with 27.72% contribution. The higher production of hand line is accounted for tuna and other large pelagic species. Small pelagic species dominated the catch of gillnet and multiple hook and line, while the majority of the species caught by bottom set longline included hard demersal species.

Moreover, results gave an implication that traditional fishing techniques or methods still exist in these 6 barangays in the coastal areas as an ancient practice that has been an essential part of human life during the past decade. Different peoples in these coastal barangays developed different fishing techniques to survive in their environment such as spear fishing, drop line, towline, dive goggles or pana, gillnet, UW torch, wading net, hook and line and many others.

3.4 Perception of Fisher folks on the Effect of Climate Change

TABLE 3. Effect of Climate Change as perceived by the Fisher folks

Attributes							Total	Percentage
	A	B	C	D	E	F		
1. Increase in Temperature	10	11	10	12	13	13	69	86.25
2. Droughts	11	12	13	13	12	12	73	91.25
3. Decrease in rainfall	9	10	10	11	10	11	61	76.25
4. Flood	13	12	11	12	13	14	75	93.75

In the Philippines, the Bicol Region is one of the most disaster-prone areas and high-risk environments due to its geophysical location (DA, 2014 and Cuesta, M. and Ranola, R. F. Jr., (2009) [24,25]. Table 3 presented the perception or awareness and local adaptation strategies on climate change by Fisher folks. There are four (4) attributes on climate change by fisher folks. Among these four (4) attributes, the respondent's rated flood as the highest with a rating of 75 or 93.75 percent; followed by droughts; a total of 73 with a percentage of 91.25 percent; while the last attribute was decrease in rainfall with 61 or 76.25 percent. These results are supported with a report of Villarin, R.J. et.al., (2017) [26] that the major climate hazards in the five provinces of Bicol Region, Philippines are flood, drought, typhoon, erosion and volcanic eruption. A research report revealed that the provinces of Albay, Sorsogon and Camarines Sur, Philippines are included in the top 20 provinces in the Philippines which are at risk of typhoon, rainfall change, drought, and temperature increase and Camarines Sur is prone Flood hazards (Lirag, M.T. and Estrella, R., 2018) [27] which means that fisher folks in Camarines Sur, Philippines, particularly in the Partido area, are able to adapt immediately to flood hazard compared to those in the other provinces. Although according to the respondent flooding and drought resulted in loss of some species in the riverine and coastal regions due to migration while some other species died of flooding, some species of fishes have migrated to another location while some others died. This leads to low productivity and consequently reduced fish catch and low standard of living. This has also increased the spread of different types of diseases among the fishers and their household which includes malaria, typhoid etc. All these coupled with the problem faced by fishers has led them to adopt different coping strategies (Go, C.O., et.al, 2018) [28]. In order to adapt to the climate change people in this area go farming and venture into different types of enterprise just to survive and have additional income to support the needs of the family.

Climate change is associated with global warming hence flooding is now common in this area. Tabari.H., 2020 [29] explains that The hydrological cycle is expected to intensify with global warming, which likely increases the intensity of extreme precipitation events and the risk of flooding. Extreme precipitation is expected to intensify with global warming over large parts of the globe as the concentration of atmospheric water vapour which supplies the water for precipitation increases in proportion to the saturation concentrations at a rate of about 6–7% per degree rise in temperature according to the thermodynamic Clausius–Clapeyron relationship (Allen, M. R. & Ingram, W. J.,2002 and Ingram, W., 2016) [30-31]. Extreme precipitation amplification may increase the intensity and frequency of flooding, imposing heavy costs to aquatic and terrestrial ecosystems, human societies and the economy. Changes in food characteristics not only depend on the spatial distribution, time evolution and rarity of precipitation (Sharma, A., Wasko, C. & Lettenmaier, D. P., 2018)[32], but on antecedent soil moisture conditions and in snow-dominated regions on snowmelt timing (Blöschl, G. et al.,2017) and snowpack magnitude (Hamlet, A. F. & Lettenmaier, D. P., 2007)[33]. Globalscale food assessments have reported both decreases and increases in future foods under global warming (Hirabayashi, Y. et al., 2013; Dankers, R. et al., (2014); Arnell, N. W. & Gosling, S. N., (2016) and Asadieh, B. & Krakauer, N. Y., (2017) [34,35,36,37].

3.5 Sources of Information on Climate Change

Climate Change is a global challenge, hence there is a need to inform the people regarding this event in the environment. Climate change has affected the lives of people particularly the fisheries sector. Fisher folks need to be informed to cope with such challenges on the effect of global warming which in effect climate change. As mentioned by Rich Seymour, 2008 [38] that many things we do not understand, and some of the questions that remain before us may have a significant impact on the quality of our lives in the future. As our current

civilization observes an unquestioned period of warming on Earth, the issue of the nature of this change remains a topic of discussion for both scientists and the public at large. Hence we need to be informed of the real scenario of what is happening in our mother earth.

TABLE 4. Sources of Information on Climate Change (N=80)

Attributes							Total	Percentage
	A	B	C	D	E	F		
1.Radio/mass Media	12	13	11	12	14	12	74	92.50
2.Fisher folk to Fisher folk	9	10	9	11	12	11	52	65.00
3. Extension Services	11	12	10	13	11	11	67	83.75
4. Personal Experience	12	11	9	10	11	13	66	82.50
5. Neighbor Farmers	2	3	7	10	8	10	40	50.00
6.Farmer/Fisher folks Association	11	4	5	12	7	6	36	45.00
7. Market Place	1	1	2	1	10	2	17	21.25
8. Internet (Any Flat fom)	13	13	10	13	6	3	58	72.50
9. Rumors	10	12	8	12	8	12	62	77.50
10. Workshop	12	9	8	9	10	13	61	76.25
11. Researchers	10	8	7	5	11	2	43	53.75
12. Project / NGO/ Program	5	10	2	3	1	12	33	41.25

Table 4 presented the Sources of Information on Climate Change by Fisher folks. Among the twelve (12) sources of information, the respondents rated Radio/Mass Media as the topmost with a rating of 74 or 92.50 percent; followed by Extension Services with a rating of 67 or 83.75 percent while the last was Internet or Flat form with a rating of 11 or 13.75 percent. The highest rating gave an implication that in the Six (6) barangays confirmed that their sources of information was radio/mass media as a tool of communication and extension to help Partido fisher folks in their development. Radio is still the fastest means of disseminating information to the people. For them as stated by some key informants radio/mass media acts as a unifying medium of the individuals through communication for development. According to the fisher folks DZRP 94.5 FM Radio Partido was their station oftentimes heard which the scope reaches the ten municipalities of Partido Area such as: Caramoan, Garchitorina, Goa, Lagonoy, San Jose, Presentacion, Sangay, San Jose, Siruma, Tigaon and Tinambac providing access to information and entertainment. These results are similar to the findings of Bah, O.A., et.al., (2018)[39] that the main source of information on climate change was through radio and other mass media in Gambia. The lowest rating was the use of the Internet due low connectivity. This implied that LGUs and policy making to look into especially during this pandemic.

TABLE 5
Challenges Faced by Fisher Folks in Adapting to Climate Change

Attributes							**Total**	**Percentage**
	A	**B**	**C**	**D**	**E**	**F**		
1. Poverty	10	12	9	11	8	10	60	75.00
2. Lack of fishing materials	13	10	11	10	10	11	55	68.75
3. Support from government	12	11	10	11	12	13	59	73.75
4. Fishing gears and machines	13	12	13	13	12	10	55	68.75
5. Government to enforce fisheries laws and regulations	13	13	13	13	13	12	77	96.25
6. Foreign Fisher folks/Big Capitalist on Fishing	10	13	10	11	12	10	64	80.00
7. Reforestations	12	11	13	12	10	11	68	85.00
8. Protection from bad fishing ne	10	11	10	8	10	7	54	67.50
9. Feed for Fish	5	7	6	7	5	6	36	45.00

Challenges encountered by the fisher folks are mainly to enforce fisheries laws and regulations with the Rating 96.25 % (Table 5). This challenge to the enforcing agencies like the Bureau of Fisheries and Aquatic Resources (BFAR) to be more vigilant to implement the fisheries laws in order to protect the productivity in the aquatic

ecosystem. It also indicates that reforestations is also a challenge to the fisher folks. Since this area is prone to flooding, reforestation is needed to protect the coastal area from sedimentation and to save and protect aquatic animals and plants. Decreases in productivity leads to income reduction of households engaged in fisheries, dampening profitability of fishing industries. Considering fisher folks reside more in rural areas rather than urban areas, it is expected that climate change affects income of rural households more than urban households. Income of rural households is liable to decrease as climate change continues, and it is expected to deepen as climate change becomes extreme (Suh, D. and Pomeroy, R., 2020) [40]. During the face to face interviews with the fisher folk confirmed that climate change adaptation is very crucial in order to respond to the extreme weather warnings and adapting to the effect of climate change which several factors play a significant role in how the fisher folk adapt and respond to weather warnings; a well-connected community; trust on the authorities disseminating weather related information, the perceived reliability of the weather warning and perception of risk and education level of the fisher folks.

TABLE 6. Diminishing Sustainability of Traditional Fishing Practices

Attributes							Total	Percentage
	A	B	C	D	E	F		
1. Overfishing	12	10	13	12	13	13	73	91.25
2. By Catch	10	9	10	9	10	11	59	73.75
3. Damage to the ocean	11	13	12	12	10	8	66	82.50
4. illegal fishing	13	12	11	11	11	10	68	85.00
5. dynamite fishing	12	10	7	4	3	8	43	53.75

Table 6 presented the Diminishing Sustainability of traditional fishing practices to enhance the resilience vulnerable to climate change. Based from the table, among the five (5) parameters, the topmost was overfishing with 73 responses and a percentage of 91.25; followed by illegal fishing rated by 68 respondents with a percentage of 85.00 percent; while the lowest rating was dynamite fishing with 43 or 53.75 percent. During the face to face interview, fisher folks confirmed that overfishing still exists and rampant in some areas in Partido Area which leads to declines in fish populations, ecosystem wide impacts, and impacts on dependent human communities. Commercial fisheries were not managed properly that can destroy the marine ecosystem. Trawl nets and other fishing gear used by these commercial fisher folks destroy marine habitat and catch large amounts of young and non-targeted fish species. Hence, small scale fisher folks just depend on the techniques or methods they have developed. However, the Bureau of Fisheries and Aquatic Resources in coordination with the Partido Development Administration (PDA) provided technical assistance to the municipalities of San Jose and Presentacion, Camarines Sur, Philippines on the establishment of fish sanctuary and marine reserves. A GIS based map of the marine/ protected areas, fish sanctuaries in Partido was also developed as a planning tool for intervention. Another is the creation of Bantay Dagat (BD) Program which is a community-based law enforcement institution in Partido that engages fisher folks in coastal barangays on a volunteer basis to support the detection and enforcement of illegal fishing in coastal waters. Due to this support from the government agencies, the lives of the fisher folk may improve. Hence, constant monitoring and enforcing the law religiously will improve the indigenous fishing techniques of the fisher folks.

4. CONCLUSIONS

The Bicol region, particularly Partido Area of Camarines Sur, Philippines were. affected by the climate change. Traditional fishing techniques or methods still exist in the coastal areas barangays of Partido Area in Camarines Sur, Philippines as an ancient practice that has been an essential part of human life during the past decade. Different peoples in these coastal barangays developed different fishing techniques to survive in their environment. A constant flooding in the coastal area has affected the fishers in using their Indigenous fishing gears. The coastal communities are put at higher risk in endeavoring into the sea as climate change causes hazard to the area. Hence, rural fisher folks need to be informed. The government agencies such as: the BFAR and PDA must provide technical assistance to the municipalities of Partido Area on the establishment of fish sanctuary and marine reserve used weather information and should apply and implement of similar climate mitigation and adaptive strategies as potential solution to reduce current and future vulnerability of fisher folks in coastal barangays.

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