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Dolphinfish Fisheries in Batanes: Coping with Climate Change Through Mataw Fishing Tradition

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Abstract

The increasing water temperature and changes of ocean chemistry as a result of climate change are already being felt in the fisheries sector elsewhere as evidenced by the decreasing catch per unit effort and changes in seasonal occurrences of major marine species in the Philippines today. Amid this grim scenario, an indigenous fishing practice in Batanes Province called Mataw was assessed and found to be a good mitigating strategy in combating the ill effects of this phenomenon. Mataw, which is a cultural tradition of the Ivatans involving dolphinfish (*Coryphaena hippurus*) fisheries, was able to maintain a sustainable level of stocks of the said fish in Batanes. The social values espoused by the tradition, such as patience, discipline, cooperation and fair play together with simple rules which fishermen follow in their fishing operations served as a climate change mitigating strategy that can be as effective but not as complicated and costly as the present fisheries management strategies implemented in the Philippines. The study was conducted through the assessment of landed catch in the six municipalities of Batanes in two phases of stock assessment from 1997 to 2007. Focus group discussion was also done to determine the socio economic impact of the tradition on the fishermen. The results showed that size range of the recorded length frequencies is from 67.5cm - 142.5cm during the 1st phase of the stock assessment and 87.0 cm - 134 cm during the 2nd phase. Computed length at first maturity (Lm) was 67.9cm and maximum yield of 102.3cm. This implies that dolphinfish caught in Batanes have already spawned at least once and have contributed to the recruitment process prior to being caught. Other climate change mitigating strategies include maintenance of environmental integrity, imposition of fishing gear and boat restriction, a collective marketing scheme, preservation of the fish for the future and strong governance support. The Ivatans can be assured of sustainable production of dolphinfish if this practice will be continued by the next generation.

Keywords: Dolphinfish, Batanes, Mataw fishing, climate change

1. Introduction

Fishing pressures during summer time in the coastal waters posed one of the most common problems met by the fishing community in the Philippines today (Barut, 1997). It resulted in overexploitation of resources because of the notion of the common property system, which collectively gives ownership rights to the society. In a way it lessens the incentives of people to protect their resources (IPDP, 1993). A pitfall is the lack of discipline among fisherfolk which becomes a limiting factor in resource management (Herrin, 1993). The notion that the increasing production would mean more food for the people, ironically resulted in greater poverty among small scale fishermen (Garcia, 2004). The Ivatans, the

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term given to the people of Batanes, are not exempted from such norms. The geographic location and the extreme climate variability felt in the islands, have forced the Ivatans to take advantage of the good weather to supply the fish requirement of the province for the whole year.

Batanes is located at the northern most tip of the Philippine archipelago. Its geographic location makes it the most exposed area to climate hazards, affecting the livelihood and economy of the majority of its fishermen. The province is bounded on the north by the Bashi Channel, on the east by the Philippines Sea, on the west by the South China Sea and on the south by the Balintang Channel. It has six municipalities (Basco, Ivana, Mahatao, Uyugan, Sabtang and Itbayat) and 29 barangays. It is nearer Taiwan (190 km away) than Aparri (280 km) the nearest mainland municipality of Cagayan Province (NEDA 2, 1991). The topography of the province is hilly and mountainous, with only 1,631.50 hectares or 7.10% of its area level to undulating and 78.20% or 17,994.40 hectares with varying topography, from rolling to steep and very steep. Forty two percent (42%) or 9,734.40 hectares are steep to very steep land (Provincial Government of Batanes, 2000). Fishing is the primary source of livelihood of majority of the Ivatans, however, most of them are also involved in livestock raising because of their productive pastureland. This becomes their livelihood when the weather conditions are not favorable for fishing. .

Typhoons occur in the area at an average of 13 times in a year, mostly from June to September (Provincial Government of Batanes, 2000). The temperature ranges from 14.5o C to 37 o C with the coldest during December and the hottest during summer (March to July). For the past years however, the weather condition is observed to have changed. Typhoons are now being experienced even during summer.

Although the province's geographic location makes it highly vulnerable to climate change, the Ivatans have become well adapted and resilient to extreme weather disturbances. From the architectural and engineering design of houses, which are mostly thick walled, fisheries activities have also adapted to the changing weather of the province such that fisheries management has become a positive reinforcement allowing stocks to regenerate by themselves. The stoppage of fishing operations during inclement weather have become a natural closed season where fish stocks are allowed to breed and reproduce.

Incidentally, in the absence of a perfect management strategy, a traditional fishing practice in Batanes Island called Mataw was found to be effective in ensuring sustainability of one commercially important marine species of the province, the dolphinfish (*Coryphaena hippurus*), locally called Dorado. The practice employed by the fishermen was found to be a good mitigating strategy against climate change that can sustain the productivity of the dolphinfish stocks in Batanes waters. The indigenous knowledge had taught its people patience, respect, discipline, and skills that had helped them cope with climate change.

This study assessed and analyzed the impacts of the tradition on dolphinfish stocks in Mahatao and Basco, Batanes where the Mataw is practiced. Climate change coping mechanisms were deduced from the strategies espoused in the tradition.

2. Methodology

1) Socio-economic

Focus group discussion and inter personal interview were used for the socio economic part of the study. A total of 38 key Mataw fishermen leaders were interviewed using a structured questionnaire.

2) Seasonality and size at first maturity

Data on seasonality and size at first maturity were taken from the 10 year data of National Stock Assessment Program (NSAP). A minimum of 10 boats were sampled taking 10% of their catch per sampling. During the initial stage of the study, trained NSAP enumerators conducted boat and gear inventory in the entire province. Inventory taken in 2001 was updated in 2005.

Sampling was done every other two days (e.g. 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31 or 2, 5, 8, 11, 14, 17, 20, 23, 26, 29) regardless of Saturdays, Sundays, and Holidays, at the different identified landing centers. A maximum of 10 boats were sampled per day. Sampling was done to at least 10% of the fish catch. All data were obtained by direct catch measurement and by interviewing the

fishermen at the sites during the landings.

The data used in the estimation of the production contribution of trawl line and species composition was raised to the totality of the study area using percentages based on the raw data and extrapolated to the raised catch. Data in seasonality of the species on the other hand was based on the sampled production.

All data gathered were recorded in the standard survey forms and were compiled and consolidated for computerization. The electronic data were processed, analyzed and interpreted using FiSAT. Two phases of stock assessment were undertaken to determine of which the first phase was conducted from 1997 - 2002 and the second phase from 2002 to 2007.

3. Results and Discussions

1) The study area

The study was conducted in Diura in Mahatao and Vulugan in San Juaquin, Basco Batanes (Figure 1). Rudaw Achip, a prominent red hill in the area with a big cave, serves as a marker for the fishing ground being regulated. Vulugan and Mananiog bay located in Mahatao is the specific site where this tradition is practiced.

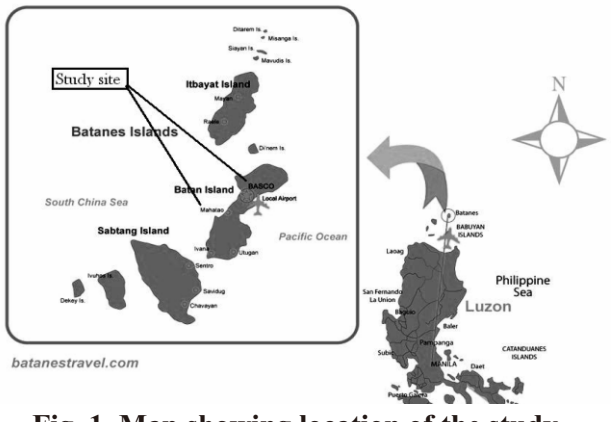

Fig. 1. Map showing location of the study.

2) The Mataw fishing tradition

Mataw tradition originates from folklore a long time ago, concerning instances of fishermen meeting accidents in the sea while fishing. The fish folk attributed their misfortune to spells of the gods of the sea who got angry at the fishermen. A group of fishermen decided to break the spell so that safe fishing operations and abundant catch was assured. They started making rituals called Mataw which they believed would make the gods happy.

Mataw is an Ivatan term which means collective fishing activities (Mangahas 2006). The tradition was introduced by the Dominican missionaries from Spain in the 19th century, and up to the present has been adopted by a group of fishers in Mahatao and Basco, Batanes (Mangahas 2006). Mataw fishing tradition is usually done from March 5 to May 15 of every year when the dolphinfish stocks are abundant in the area.

Mataw tradition commenced by the "making of the Vanua", a ritual meant to clear the passage of the fishermen for its safe fishing operation in the bay. The rituals include sacrificing a pig, offering sugar cane wine, a bead and coin (Mangahas, 2010). The sugar cane wine offering is assumed to have cleansed the dirty part of the Vanua or port and the Mandinaw de Vanua or the head fisherman.

In the tradition, a head fisherman or the mandinaw de vanua, who is the most respected elder among the group is chosen and is accorded with the chance to be the first one to fish during the Mataw season. His role is to talk to the fish and the gods for successful fishing operation. In the tradition, the mandinaw de vanua is expected to have persuaded the fish to choose the fishermen. He determines the readiness of the area for the fishing operation (Mangahas, 2010), and the instance he is able to catch dolphinfish signals the start of fishing for the rest of the fishermen.

3)Dolphinfish species caught in Batanes waters

Two species of dolphinfish (Fig. 2) are caught in the coastal waters of Batanes. These are the

Fig. 2. Dolphinfish caught in Batanes.

common dolphinfish (*Coryphaena hyppurus*) and the pompano dolphinfish (*Coryphaena equiselus*). Dolphin fish is found in coastal waters all over the world. Specific distribution includes the Gulf of Mexico, the Caribbean Sea, the Mediterranean Sea, North and Central America, and the Western Pacific. They grow at a rate of 1-1.5ft per year (Palko et.al, 1982). These species prefer water with temperature above 21oC. They are highly migratory species but the reason for this behavior is not yet well established. Ruff, 1999, however cited that migratory behavior may be associated with food search or as a pre spawning activity. Dolphinfish are voracious feeders. They prefer to feed on flying fish and other marine fishes. This may be the reason why they are also seen in Batanes's waters because during summer, flying fish abound in the area.

In Batanes, dolphinfish exhibit seasonality similar to that of its prey, the flying fish. They can be found throughout the year but their population starts to increase from February, with its peak in April, and gradually declines for the rest of the year (Fig. 3). Seasonality for the 10 years assessment period showed a fluctuating trend. The catch trend showed a period of decrease followed by an increasing value specifically on the peak months of its occurrence. This trend implies a controlled exploitation rate of stocks despite continuous fishing through the years.

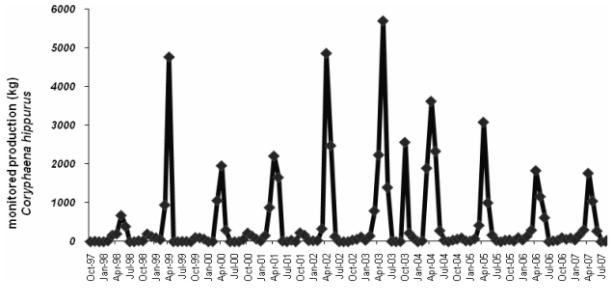

Fig. 3. Seasonality of Coryphaena hippurus (October 1997 - September 2007).

4) Climate change coping strategies as espoused by the Mataw fishing tradition

(1) Maintenance of environmental integrity

Diving and swimming are prohibited near the vanua or port during Mataw season. People believe that the fishing ground will be disturbed if there is any activity near the port. With this prohibition, throwing away of materials often brought by the swimmers is also avoided. Likewise, oil leaks are avoided because they only use non-motorized bancas. Mataws believe that the motorized bancas will produce noise that will drive away the fish. These beliefs have helped preserved the integrity and cleanliness of the pristine aquatic flora and fauna of the area where the Mataw fishermen operate. The discipline and respect imposed in the tradition aided them in the maintenance of the soundness of the coastal environment.

(2) Imposition of gear and vessel restriction during the open season

Climate change adaptation strategies which ensured fish population regeneration through gear and vessel restriction was illustrated in the Mataw tradition. Two kinds of fishing gear used to catch dolphinfish in Batanes and Cagayan were assessed. These are trawl lines and bottom set gillnets. However, in Mataw fishing grounds, only trawl lines and non-motorized bancas are used. Bottom set gillnets are used to catch the fish in Cagayan. Analysis on the efficiency of the fishing gear used was done by determining the age at first maturity (Lm) of the fish caught with the two kinds of fishing gear.

A stock has reached maturity if it has the capability to reproduce in a determinate spawning season (Tawil, M.Y. et al). Fish caught before they reach their sexual maturity have not yet contributed to the next generation of stocks (Reyes, 2010). Such maturity is dependent on the size of fish in a given stock. In this study, the size of dolphinfish caught by Mataw fishers using trawl lines ranges from 67.5 to 142.5 cm and 87 - 134 cm during the 1st phase and 2nd phase of the project, respectively. They have an average length of 112-115 cm. Fishbase computation, estimated its Lm at 67.9cm while length at maximum yield was at 102.3cm. This implies that except for the catch at length 67.5 cm, all other dolphinfish caught are above the Lm. This shows that the dolphinfish caught were already able to spawn at least once and have contributed to the recruitment process prior to being caught. Maximum economic yield (meat and price) from the dolphinfish were also obtained because the common length measurements are well above the estimated length at maximum yield (102.3cm).

The efficiency of trawl lines was also compared with that of the bottom set gill nets which are being used for dolphinfish fishing in Cagayan. The result shows that ninety-nine percent (99%) of trawl lines' recorded length frequencies are beyond the 67.9cm Lm for this species (Figure 4) while 100% of the bottom set gillnets catch (length range 22 cm - 31 cm) is far below the computed Lm. At this size the fish is still in its juvenile stage and has not contributed to the recruitment process. This implies that bottom set gillnets can cause stock depletion as fish caught have not reached their Lm.

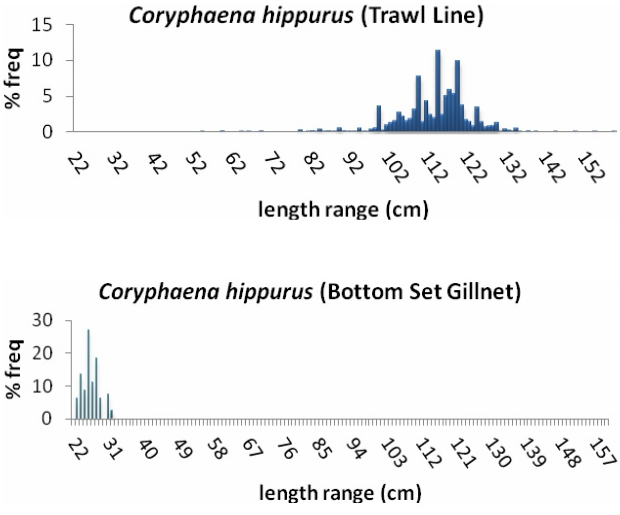

Fig. 4. Percentage length frequency of Coryphaena hippurus caught by Trawl line, bottom set gillnet and drift gillnet (Oct. 2002 - Sep. 2007).

(3) Preservation of fish for the future

To enable Ivatans to cope with climate change and assure them of enough food during out of fishing season, they process the dolphinfish caught for future consumption. Processing is simply done by splitting the fish from the center, removing the entrails including the dark muscles, soaking in salt for overnight and drying for about three days depending on the intensity of the sun.

The dried dolphinfish which is now called Aruyu are then stored or hung near the fugon (makeshift cooking facility) of their kitchen until the end of the fishing season. Smoke facilitates the curing process of the fish and prolongs its shelf life. Bacterial and fungal growths are hampered by the process.

(4) Collective marketing schemes or agreement

Marketing of produce is one of the most interesting parts of the tradition. No fish is sold or given to any members of the group until the end of Mataw fishing to equally share the catch among all members. Those contribute additional input such as salt for processing will get additional shares. For some reason, this practice had taught the Ivatans patience, discipline, cooperation and fairness in dealing with people since they have to wait for three months before they can sell their produce. After three months all the Aruyu are equally shared among the members of the group. Target markets are the local population and foreign tourists visiting the province. Some Ivatans stock them as reserved food until fishing season is possible again. The Ivatans are very strict with this practice because of the belief that fair distribution of blessings can only be realized after all the hardships are overcome.

(5) Strong governance support

Recognizing the positive impacts of Mataw fishing practice and in order the preserve the tradition, the Local Government Units issued a local ordinance (No 03-03) preserving the cultural and traditional fishing method of Mahatao. This became a law which serves as a guide to the Ivatans in fishing in areas where Mataw is being practiced. Corresponding penalties are imposed on violators of the ordinance. With this issuance, the Ivatans became aware of the prohibitions on fishing in Mataw fishing grounds.

5) Effects of Mataw fishing tradition on economic condition and income of fishermen

Taking into consideration the positive impact of the tradition on the stocks, its economic aspects were also looked into by this study. Thirty eight (38) Mataw fishers belonging to the elders in the organization were interviewed. The age range of respondents was from 18 years old to as old as 71 years of age. Those belonging to the age range of 30-40 and 41-53 comprised 34 and 24% of the total population, respectively. About 66% were married with 34% single and those that were married had an average of one to three children. Also, 50% of their children were under 20 years of age which meant that they were still dependent

on their parents for a living. The majority of the respondents were high school graduates (42%) although about 34 % had college education. This information implies that the Mataw fishermen having a relatively high education could understand social limitations such as having many family members to support hence most of them had a small number of children. Such a factor is a good foundation for the practice of Mataw, which requires understanding and discipline.

The type of houses can be differentiated in terms of roofing The majority have flat concrete roofing (63%) and about 34% have cogon roofing (34%). This roofing protects them against the adverse effects of climate change such as the strong typhoons that frequently visit the province. These houses also have a good supply of water being distributed by Mahatao Water Project and electric systems, courtesy of the Batanes Electric Cooperative. Provision of such utilities has been very recent in Batanes. This is one indication of the improvement in the economic condition of the Mataw fishermen. In Batanes having a dwelling with concrete roofing is an indication of a well off economic situation and so is having utilities such as a water system and electricity.

All respondents were fishermen, but some did other farming activities to augment their income. There were three respondents who were government employees that participated in the Mataw fishing operation to augment their income. The presence of the government employees in the practice of Mataw showed that indeed the fishing tradition was economically satisfying and hence worth the time spent on it.

Survey results also revealed that income during Mataw fishing season was higher than during the ordinary fishing season. For the entire Mataw fishing season, fishermen can catch as many as 120 dolphinfish which translates into an earning of P78, 000.00 when sold at P650 per piece in dried form. Selling is still traditional and on per piece basis, not per kilogram. Large-size fresh dolphinfish usually has an average weight of 7.5 kg. When gutted and dried at 20% moisture content, only around 1.5 kg are left. The income derived from the dried Dorado is almost four times higher than during the ordinary fishing season. Fresh dolphinfish is sold at an average of P100.00 per kilogram. Respondents also mentioned that since the income is derived only after the Mataw season, it compelled them to save for the future, particularly for the education of their children or for investment in household equipment and furniture.

Conclusion

Climate change coping mechanism in fisheries management taken within the context of the province does not need complex strategies to become efficient and effective. Indigenous knowledge enhanced with good human values plus assistance of concerned government agencies and the Local Government Units as catalysts can make resource management easy and effective. The patience, discipline and fairness acquired by the fishers as espoused by the Mataw tradition had contributed to the effective utilization of resources. Also, the use of only one type of gear (trawl line) and bigger baits (flying fish) allowed the fish to reach sexual maturity and spawn before they were caught. The use of non motorized bancas and prohibition of diving and swimming during dolphinfish fishing season in Mataw fishing grounds are also good practices that can maintain the integrity of the coastal environment. These regulations minimize pollution and decrease the cost of the fishing operation.

With this practice, the catch trend shows that fish stocks can recover despite continuous exploitation of the species by restricting the gear and boat to trawl lines and non motorized bancas resulting in controlled sizes of fish caught beyond their length at first maturity. This suggests that the future generation can be assured of a supply of dolphinfish if the tradition will continue to be adopted by the next generation. The increase in income and savings which the people can use in times of calamity can also be achieved through this tradition. Most of all, the discipline that was imposed on the fishermen by the tradition can ensure resource sustainability even with adverse climate change. Likewise if this practice is continued, the Ivatans are assured of sustainable production of dolphinfish because prior to being caught the dolphinfish has already reproduced at least once.

Apparently, the regulations implemented during Mataw season may have effectively enforced positive change in sustaining the productivity of

the dolphinfish fisheries of Batanes. The practice of Mataw in some ways has helped the Ivatans cope with the changing climate in the area and has helped to ensure food availability in times of calamity. If this kind of coping mechanism is possible in Batanes which have experienced the worst weather conditions in the country, the similar practices can be applied in other areas having the same or related fisheries situation.

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