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Report

Preliminary investigation on the collection and trading system of crablets (*Scylla* spp.) in Cagayan Province, Philippines

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Abstract
This research investigated the collection and trading system of crablets (*Scylla* spp.) in Cagayan Province, Philippines. For data collection, the areas within the province with crablet resources were identified and further validated through field visits, group discussions and individual interviews among stakeholders. Results showed that eight municipalities (Claveria, Sanchez Mira, Abulug, Pamplona, Gonzaga, Sta. Ana, Buguey and Aparri) in the province were identified to have collection of crablets from the wild. The trading system consist of gatherers and consolidators at the village and municipal levels. The size classification used include: *langaw-langaw* (fly-sized); thumbtacks (head of thumbtacks); single/double/five-finger and the price ranges from Php 0.50 - 25.00 (US$ 0.0095 - 0.4738) depending on size. The collected crablets were customarily shipped out from the province and the usual destinations include: Pampanga, Bulacan, Bataan, Pangasinan and Roxas City. For the distribution channel and marketing chain, it was observed that the gatherers sell their collected crablets to the municipal consolidators who in turn sell it to the bigger consolidator and/or grow-out operators in the province or directly shipped out of the region. This activity provides an economic benefit to both gatherers and consolidators with the gatherers earning from Php 200.00 to 17,500.00 (US$ 3.79 - 331.63) per month depending on season while the consolidators earn Php 1,000 to 40,000 (US$ 18.95 - 758.01). As this activity commands economic benefit but unregulated extraction threatens the natural stocks, some municipalities passed ordinance to control the collection of crablets. Information derived from this investigation can serve as baseline information and inputs to possible crafting of resolutions or ordinance in respective municipalities to ensure sustainability of resources.

Key words: Cagayan, crablet, collection, trading system sustainability

INTRODUCTION

Cagayan Province is located in the northeastern most part of Luzon, Philippines and occupies the lower basin of the Cagayan River. The province has vast expanse of valleys, open coastline on the north and an irregular one on the east facing the Pacific Ocean. The eastern coast is rugged and mountainous; the northern coastal areas are level while the western part is low and swampy (Ayson and Encarnacion 2008). With a coastline of 585 km, the province is known for its abundant marine and estuarine areas. It is a home to 48, 980 registered fisherfolks (BFAR RO2 FishR 2018) who depend on the aquatic resources as primary source of livelihood.

Cagayan Province is rich sources of several wild stocks such as elvers (Ame et al. 2013), milkfish fry (Villaluz et al. 1983), grouper fry (Ayson and Encarnacion 2008) and crablet (Panaguiton 2017) among others. The mudcrab seed stock, crablet (*Scylla* spp.), locally known as *crabling* or "*rissing*" is widely distributed in the Cagayan Province. Many subsistence fisherfolk depend on the collection of this resources for living. However, as crablet production does not take part of top aquatic resources in the province, no harvest report is available at hand.

Crablets, when grown to marketable size command high

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market price. The total production of mud crab from aquaculture was estimated at 13, 720 tons and valued at US$77,025,000 and 14,437 tons valued at US$86,511,000 in 2009 and 2010, respectively. However, the sources of crab seeds for farming are from the wild and in recent years, from the hatchery although in small percentage (Quinitio 2015).The lack of hatchery facility to produce crablets has been a challenge for the continuous source of seed stock and hampers the expansion of crab industry, hence the dependence on wild stocks.

The increasing demand and lucrative income from crablets makes its collection as worthwhile business in the province. While this activity provides additional revenue to marginalized fisherfolk, the sustainability of crablet resources is threatened. The unregulated collection of crablets has endangers stock recruitment. The issue on high exploitation rate and collection of small-to medium-sized crabs affect resource regeneration. While no harvest data is available to support the declining trend, the perception and observation of the community on the decreasing population of crablets is an indicator that the resources is at the verge of overexploitation. Some municipalities in the province already passed ordinances to regulate the harvest of crablets by prohibiting to catch and market smaller-sized crabs, however, enforcement of regulations is not maintained.

Noting the importance of crablets ecologically and economically, it is proper to study the collection and trading system of crablets in Cagayan Province. The results of this study will be useful inputs to policy formulation particularly for crafting legislations which will ensure the sustainability of crablet resources.

STUDY SITES AND METHODOLOGY

Study Sites

The province of Cagayan (Fig. 1) is geographically located in the north-eastern tip of the Philippines which is located along the path of Kuroshio Current. The province is known for its diverse ecosystems and characterized by extensive seaweed and sea grass beds and coral reefs which support highly diverse aquatic organisms (Encarnacion and Ayson 2008).

Cagayan province is composed of 12 coastal municipalities with coastal land area of 143,874 ha (Pasion and Tumaliuan 2005). Based on the latest assessment conducted by the Department of Environment and Natural Resources - National Mapping and Resource Information Authority (DENR-NAMRIA), the Cagayan Province has the following coastal resources: 10, 404 ha corals, 1, 606 ha seagrass and 5,083 ha mangroves.

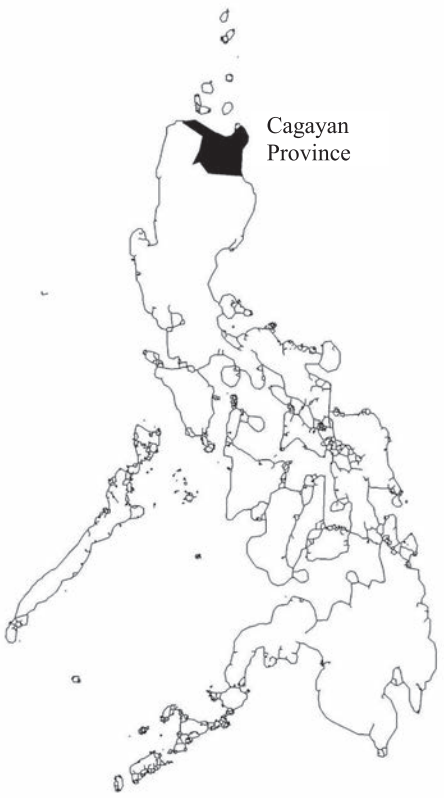

Fig. 1. Map showing the location of Cagayan, Philippines (source: Modified from the LGU Coastal Map, Municipal Coastal Environment Profile).

The municipalities which are known to be the major collection area of crablets in the province were considered in this study. These areas have mangrove resources which is the primary habitat of crablets.

Methodology

Secondary information through document tracing were done to collect information on the identification of areas with crablet resources in Cagayan Province. These information were confirmed and validated through field visit in coordination with the Local Government Unit (LGU) of the respective municipalities through their Municipal Agriculturists and in collaboration with the Bureau of Fisheries and Aquatic Resources - Provincial Fisheries Office of Cagayan through the Fisheries Livelihood Development Technician (FLDT) assigned in the different municipalities.

The crablet gatherers and consolidators in each village were identified and enumerated. Focus group discussion and individual interviews using structured questionnaires were done to gather desired information. The data were then encoded, tabulated and analyzed.

RESULTS AND DISCUSSIONS

Areas in the province with crablet resources

With verification from the field, eight municipalities (Fig. 2) - Claveria, Sanchez Mira, Pamplona, Abulug, Aparri, Buguey, Gonzaga and Sta. Ana - were identified to have crablets resources. Pasion and Tumaliuan (2015) identified the same municipalities with mangrove areas in the province. Mangrove areas in the province are distributed throughout the municipalities of Abulug, Aparri, Buguey, Calayan, Claveria, Gonzaga, Pamplona, Sanchez-Mira, Santa Ana and Santa Teresita. In this study, no crablet resources was gathered in the municipality of Calayan and Sta. Teresita but grow-out culture was noted as being practiced in the latter. Mangroves play an important role in maintaining the ecological balance of coastal communities at Cagayan as it provides habitat and nursery ground for many species, and thus supports the fisheries. Mangrove areas provide important sources of seafood such as mollusk, gastropods and numerous food fish (Pasion and Tumaliuan 2015).

Number of crablet gatherers and consolidators per village per municipality

The marketing channels for crablets consist of a network of gatherers and consolidators at the village and municipal levels, supplying both local markets and shipping out to other coastal towns and provinces. The two important stakeholders were identified to have access on crablet resources - the gatherers and the consolidators. The gatherers are the small scale fisherfolk that augment their income from fishing by collecting crablets during its season. Crablet collectors are the key contributors and play dominant role in the crablet supply and distribution chain. They collect crablets from the estuarine areas and sell these to the consolidators. The consolidators were the capitalists who buy the crablets directly from the gatherers and consolidate it before selling or shipping it out to other buyers. The consolidators are usually fishermen who have the financial capability to venture in such business. A total of 670 gatherers and 29 consolidators were identified in 25 villages from the eight municipalities in the province.

Table 1 shows the number of crablet gatherers and consolidators at the village and municipal levels as identified during the assessment.

Income derived from the activity

The gathering of crablets from the wild definitely contributed to the economic status of the marginalized fisherfolk. Fishing activities of coastal communities from these municipalities are usually done in the municipal waters using small scale boats. The fishing activities is dictated by season in the area, hence it is multi-gear and multi-species type of fisheries. Gleaning is also a common activity among the coastal communities with the availabity of seaweeds and shell species in the area. In some cases, fishing activities contributes 23-50% of the annual household income in some municipalities (i.e. Gonzaga and Sta. Ana) in the province (Ballad et al. 2018).

The crablet collection and consolidation provides an economic benefit to both gatherers and consolidators with the

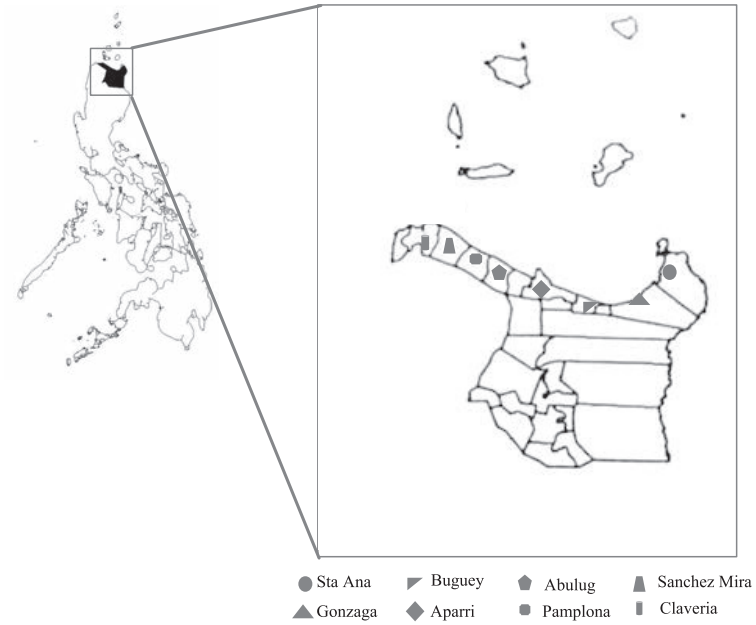

Fig. 2. Map showing the location of crablet resources in Cagayan, Philippines.

Table 1. Number of crablet gatherers and consolidators per village per municipality.

Municipality	Villages with crablet resources	No. of Gatherers	No. of Consolidators
Sta. Ana	Palawig	9	1
	Sta. Cruz	8	
	Diora-Zinungan	7	
	Tangatan	6	
Gonzaga	Caroan	24	2
Buguey	Centro	23	
	Centro West	24	
	Leron	78	
	Minanga Este	33	
	Minanga weste	9	
	Sta. Maria	12	
	Villa Leonora	23	
Aparri	Bisagu	158	7
	Linao	94	6
	Caggaman	18	2
Abulug	Centro	1	3
	Siguiran		3
	Sto. Tomas		3
Pamplona	Tupanna	22	
	Bidduang	54	
	Sitio Patiqui, Allasitan	11	
	Sitio La Paz, Allasitan	27	
	Nagtupacan	2	
Sanchez Mira	Namuac	2	2
Claveria	Pata East	25	
TOTAL		**670**	**29**

gatherers earning from Php 200 to 17,500 ((US$ 3.79-331.63) per month depending on season while the consolidators earn Php 1, 000 to 40, 000 (US$ 18. 95-758. 01). The crablet gatherers, however, in most of the cases did not get actual price of their products due to limited funds hence need to take an advance payment or loan to consolidators. The gatherers were bound to sell the crabs at a low price or price dictated by consolidators who provided them loan in their lean period. The consolidators earn 50-80% more than that of the gatherers.

Size classification and pricing system of crablets

The size classification/grading system follow the carapace size of the crablets, however, the prices varies among the municipalities. Common sizing used include: *langaw-langaw* (fly-sized); thumbtacks (head of thumbtacks) and single/double/five-finger. The price ranges from Php 0.50 - 25.00 (US$ 0.0095-0.4738) depending on size. The price of juvenile crabs depends on the season, size and availability. Table 2 list the crablet size classification and the

Table 2. Crablet size and corresponding gatherer's price range.

Size	Description of size/estimated carapace width (cm)	Price range (Php)
Langaw-langaw	Fly size (<1 cm)	0.50 - 1.00
Thumbtacks	Head of thumbtacks (1 - 1.5cm)	1.00 - 2.00
Triple/ Five Finger	Ten to twenty five centavo coin (1.5 - 2 cm)	10.00- 12.00
Double	One peso coin (2.5 - 3cm)	15.00 - 20.00
Single	Five to Ten peso coin (>3cm)	22.00 - 25.00
Big	Matchbox size	28.00 – 30.00

corresponding gatherer's price range and Fig 3 illustrates some of the crablet sizes in the province. The price of crablets from the consolidator' s price varies depending on the different trading levels it came from, time they handled the crablets prior to trading and other factors dictated by the market. The *langaw - langaw* for instance, cost Php 5-10 (US$ 0.095-0.19) when it reached Roxas City, Capiz, a known crab production in the Central Philippines (Panaguiton 2017).

Fishing gears used in collection of crablets

The fishing gears used in the collection of crablets include scissor net and fyke net for smaller sizes and crab lift net for bigger sizes. The scissor net or triangular net (Fig. 4A), locally known as "*dusdus*" is made of fine mesh size net which is pushed in shallow waters over the seabed to collect crablets. The fyke net (Fig. 4B), locally known as "*sayut*" or "*tanggar*" is a stationary net made of fine mesh net with flour sack (muslin cloth) as its bag. The gear is usually set in the evening and gathering is done the following morning. These two gears are non-selective hence by-catch is expected. The crab lift net, locally known as "*bintol*" is a lift net set in shallow waters to catch bigger crablets.

Seasonality and estimated monthly collection of crablets

The seasonality of the collection of crablets is related to the crab spawning and recruitment season. Crablet collection in Cagayan Province is observed all year round with peak during colder months and when the sea is rough (November to April) for early crab stages and lean months is observed from May to October. The crablet gatherers reported an average collection of 2,000-5,000 pieces of small sized crablets per month during peak season and 100-500 pieces during lean months.

Market channel and distribution chain

This research found that the crab trading pattern in Cagayan Province involved a series of intermediaries from

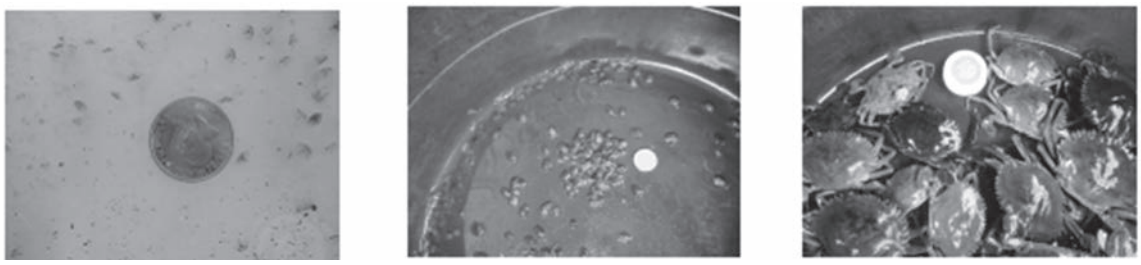

Fig. 3. Crablet size classification.

Fig. 4. Gears used in crablet collection (A) Scissor net (photo by: Shannen Fritz Manegdeg) and (B) Fyke net (Photo from BFAR Cagayan Valley FB Page).

gatherers to consolidators and to the mudcrab grow-out operators. The flow of trading system in the province is shown in Fig. 3.

Crablet gatherers are the main suppliers that play foremost role in the crablet supply chain. After collection, they sell the crablets to the consolidators from their municipality. These consolidators sell the combined crablets to mudcrab grow-out operators in the province or to larger scale consolidators from the municipalities of Claveria, Aparri, Abulug and Buguey or directly to the consolidators from the other provinces of the country. These consolidators then become the source of crablets for the known mudcrab grow-out operators in the country.

Packaging and transporting of crablets

The consolidators use basins, tubs and pails as holding facilities for the collected crablets prior to transport (Fig. 4). The crablets are being held until the supply is in enough quantity as demanded by the buyers. Meanwhile, carton box is used for transport of crablets (Fig. 5). The number of crablets per box depends on its size, for instance, around 5,000 pieces

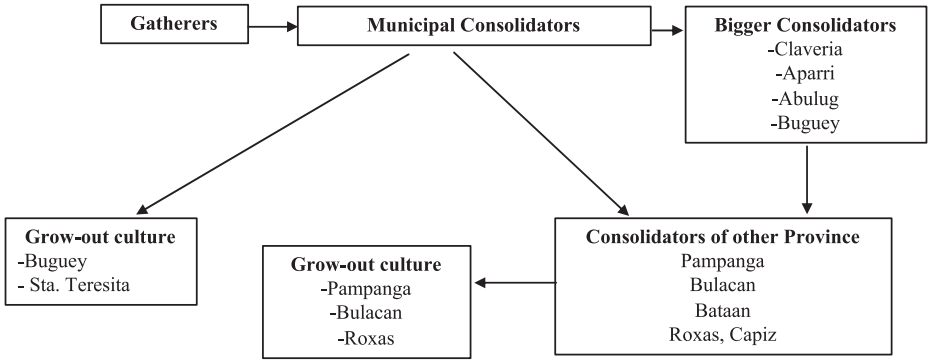

Fig. 3. Trading system of crablets in Cagayan Province.

Fig. 4. Holding facilities for crablets

Fig. 5. Packaging of crablets for transport.

langaw-langaw or 2, 000-2, 500 pieces thumbtacks sized crablets. These boxes are then placed inside a polystyrene box contained with ice to maintain the cool condition inside the box. For bigger sized crablets which are transported to nearby areas, pails with leaves are being used.

Based from the Regional Fisheries Inspection and Quarantine Service database, 21.16 MT of crablets were shipped out of the province in 2017.

Existing crablet management measures in areas covered

Some municipalities in Cagayan Province already have ordinances for the management of crablets within their areas. Table 3 list the existing management measures for crablet resources in the respective municipalities in the province. Since 1999, upon the crafting of the comprehensive municipal fisheries ordinance, the municipality of Gonzaga already included the management of crabs in their area. This was strengthened by the new ordinance declaring a total ban for the collection of crablets for five years. The municipality of Aparri is also in the process of crafting their ordinance for the management of their crablet resources. Some areas in the Philippines with crablet resources also promulgated ordinances to manage the resource, an example of which is the United Provincial Fisheries Law Enforcement Ordinance of Camarines Norte (Estanislao 2017) in Southern Luzon, Philippines.

CONCLUSION

The province of Cagayan is one of the main sources of crablets in the country. Several fisherfolk earn additional income by collecting crablets and selling it to the consolidators who in turn do the trading in or out of the province. Existing size classification based on the carapace size is observed of which the pricing depends on. While crablet collection contributes to the economic well-being of subsistence fisherfolk, the unregulated collection may lead to the depletion of the resources.

For a sustainable crablet resources in the province, the following are the recommendations that have been made under this research.

- More thorough gathering of information to include participatory resource assessment, population dynamics and value chain analysis is recommended so we can have a holistic output which can be a strong input for a development of management policies on crab resources.
- All players (gatherers, consolidators, grow-out operators) in crab trading should be organized into an association so that they will be given proper interventions by the government and will be strong partners in resource conservation and sustainability.
- Demand for crablets, its market price and the number traded outside the province should be monitored throughout the year so that appropriate policies will be

Table 3. Municipal ordinances on crablet collection.

Municipality	Ordinance	Remarks
Gonzaga	Municipal Ordinance No. 9 s. 1999 sec.57 Taking, catching, selling, processing or transporting gravid crabs and or crablets; violation of this provision shall be punished by imprisonment for a period not exceeding to 6 months or fine of not exceeding to 2,500 or both	Comprehensive Municipal Fisheries Ordinance
	Municipal Ordinance No. 03 s. 2019. An ordinance declaring a total ban of catching elvers, crablets and goby fries for a period of five years within the territorial jurisdiction of Gonzaga, Cagayan	Effective January 1, 2019
Aparri	An ordinance regulating the gathering, catching, selling and shipment of crablets and providing penalty therefor	On-going public consultation

crafted to ensure sustainability of the resources.

- Institutional intervention is necessary to introduce crab hatchery and grow-out production to minimize dependence from the wild stocks.
- Initial information derived from this investigation can serve as baseline information and inputs to possible crafting of resolutions or ordinance in respective municipalities to ensure sustainability of resources.

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