Relative Abundance and Distribution of Sea Cucumber In Ilocos Sur

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ABSTRACT

Species composition, abundance and distribution of sea cucumber were assessed along the four coastal municipalities of Ilocos Sur. Belt transect method laying 100 meters, one meter on each side of the transect by wading, snorkeling and diving. Sea cucumber were identified using the Conand's FAO Species Guide, SPC Beche-de-mer Identification Card, Schoppe Handbook and Commercial Holothurians of Bolinao, Pangasinan.

Twelve species of sea cucumber present in the shallow coastal waters of Ilocos Sur and San Esteban as the most dense area but most varied in Santiago station. *Actinophyga echinites, Holothuria atra* and *Holothuria leucospilota* were common among the areas noted. Site distribution varies on the different species and month of collection. Most commercial important species collected attained bigger sizes and found in deeper areas. An average density per square meter of only 0.08 individual or 14 individuals per 200 square meters as manifestation of depleted wildstock.

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INTRODUCTION

The Philippines is a naturally blessed with high diversity of sea cucumber species that inhabit its wide seagrass beds, soft sandy bottom areas and reef flats recorded (Schoppe, 2000, Domantay, 1968) and trade currently exists from the north to south (Formacion, 1979, Trinidad-Roa, 1987). Sea cucumber forms as an important part of a multi-species invertebrate fishery that has been inexistence in the Indo-Pacific which is traditionally used for subsistence over 1000 years. It has long been recognized as food item and a source of income especially by inhabitants of the South-Pacific countries. These invertebrates have been harvested for years in the coastal zone of temperate and tropical regions of the world. Sea cucumbers are important components of the food chain and they play an important role as deposit and suspended feeders. They are responsible for the extensive shifting and mixing of the substrate and recycle of detrital matter. They are also important in determining habitat structures for other species and can represents a substantial portion of the ecosystem biomass.

The harvesting of sea cucumber for processing into trepang (dried form) was first exported in the Philippines in 1981. Sustained demand for the product from countries like Hongkong, Japan, China and Singapore has made beche-de-mer fishery as attractive and lucrative business for many Filipinos. Due to the export quality of sea cucumber, a considerable amount of sea cucumbers have been harvested both legally (Detterias et al, 1996; Murello et al, 2003 and illegally (De Miras et .al, 1996; Martinez, 1999, Piu, 1998, 2000) which have yielded fluctuating populations. Since sea cucumber fisheries worldwide have presented cycled in which the total catch decreases despite the increase in fishing effort which in turn leads to the over exploitation of the species for low economic return (Aguilar-Ibarra and Ramirez-Soberion, 2002). The harvesting or catching of sea cucumbers has become increasingly small and less varied especially in the intertidal areas. They now have to go further and deeper for the desired sizes and still not get the same volume as before. As the collection continues, the catch includes increasingly smaller individuals and lower priced varieties.

Those observations are not only applicable to other countries but apparently seen as a problem in our country today. In line with the effort to provide a benchmark information for local, provincial and national government, this study aimed to assess the composition, abundance and distribution of sea cucumber resource in ilocos Sur as basis for recommendation to LGU's in the formulation of management plan and for the sustainability of the resource especially in the regulation of the sea cucumber harvest.

OBJECTIVES

1. Determine the species composition, occurrence and distribution of sea cucumber in the shallow coastal areas of Ilocos Sur
2. Determine the size frequency distribution of sea cucumber species in the area
3. Determine the peak season when sea cucumber species are mostly found
4. Determine the density of sea cucumber in the area

REVIEW OF RELATED LITERATURE

There are about a hundred known species of sea cucumber in the Philippines and distributed throughout the country, 25 of which are harvested commercially (Gamboa, 2003).

According to Laurence, a total of 22 species has so far identified. Of these, seven are described for the first time in Egyptian waters, while none of the species are identified unique. To the Northern coastline, ten species have only been found in the Southern region. In addition, seven species are predominantly collected as the commercial species. The distribution of each species has also been examined in relation to depth and habitat type. Most of the commercial species have found in seagrass beds with the exceptions that H. nobilis and P. graeffei were only been found in coral substrates. In addition, each of the commercial species has been mostly found in the depth range 5-10 meters. The main exception to this H. fuscogilva which was predominantly found beyond 30 meters depth and H. nobilis and H. atra which were mostly found n the reef flat.

Clear differences have been found in the abundance of the main commercial species when fished and non-fished areas are compared. Based on the numbers of animals counted on each of the transect, the mean density of the commercial species per hectare has been calculated for sand and seagrass areas. For each of the species, the density is higher in the Southern sector than in the Northern sector.

Also apparent is the low density of most valuable species compared with the less valuable (Long, et.al. 1996; Skewes et al, 2000; Uthiche and Bengue, 2001; Kinch,2002).

The country has been a major exporter of the processed trepang or beche-de-mer for the last several centuries (Akamine,2002) and the trade has been responsible for prosperity in Southern Philippines. Based on recent record, export production reached a peak of 3.499 tons, worth about US$3 million in 1985 and was followed by a drastic drop to almost half of the said volume in the succeeding year. Since then, trepan export has been maintained at 1000 tons, perhaps second only to Indonesia (FAO, 2002).

Almost all the island in the archipelago produced trepan. Among them, Zamboanga City in Mindanao and Puerto Princesa City in Palawan are largest enter pots in the Philippines (Trinidad-Roa, 1987).

There are four major trepan exporters in the Philippines (Schoppe, 2000), all of whom are Chinese-Filipino who also deals with other dried marine products such as sharks, fins and dried sea horse.

Due to the export quality of sea cucumber, a considerable amount of sea cucumbers have been harvested both legally (Detterias et.al, 1996; Murello et.al, 2003) and legally (De Miras et. al, 1996; Martinez, 1999; Piu, 1998, 2000) which have yielded fluctuating populations. Since sea cucumber fisheries worldwide have presented cycled in which the total catch decreases despite the increase in fishing effort which in turn leads to the over exploitation of the species for low economic return (Aguilar-Ibarra and Ramirez-Soberion, 2002). These trends of exploitation have been recorded in various places.

METHODOLOGY

The study was conducted in the four coastal municipalities of Ilocos Sur to wit; Narvacan, Sta. Maria, San Esteban and Santiago. For every identified municipality, one coastal barangay was designated as station in gathering the data needed in the research.

Before the study conducted, permission was asked from the LGU's and a courtesy call to barangay captain/barangay officials explaining the purpose of the research and obtaining assistance or guide in pinpointing the fishing grounds for sea cucumber areas. The information gathered provides a great value in getting samples.

Belt transect method was done by laying 100 meters, 1 meter on both side of the transect, data was gathered through wading, snorkeling and diving. Sea cucumber found was recorded and identified using the Conand's FAO Species guide (1998), SPC Beche-de-mer ID cards guide (2004),Schoppe (2000) and Menez (20070 commercial Holuthurians of Bolinao, Pangasinan. Species that cannot be readily identified was photographed and collected for later identification in the laboratory.

The data gathered was recorded based on the number of sea cucumber seen in the habitat, taking the average weight, average width and average length. Sampling was done monthly and the data gathered was treated statistically using frequency count and percentage.

MATERIALS AND METHODS

Identified barangays within the four coastal municipalities were designated as sites for sampling station as shown in Map I. Specific location of the different sampling area were determine through the GPS reading and according to the history gathered in the locality.

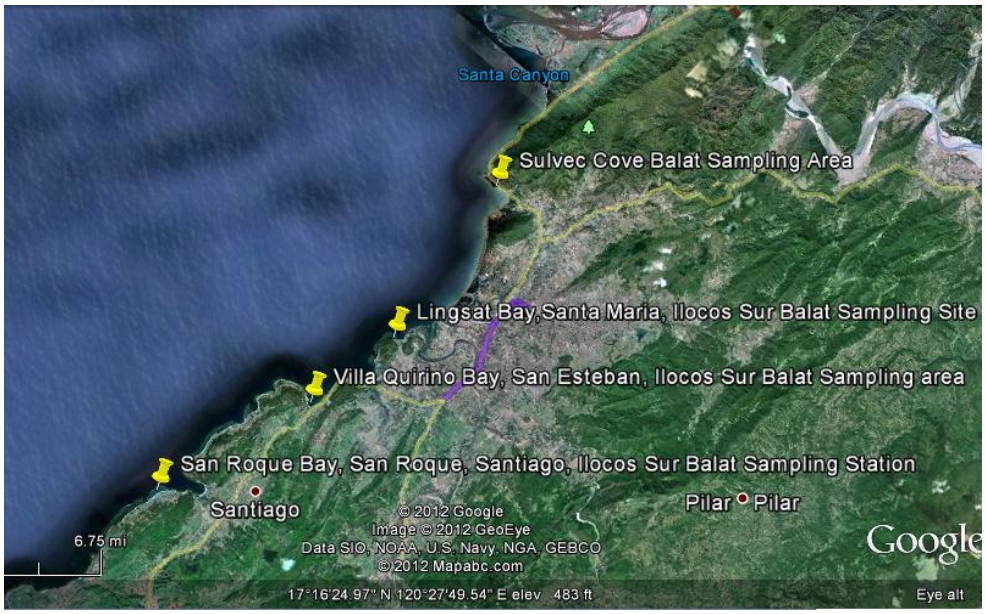

Figure I: Geographic Location of the Sea cucumber Sampling Sites in Ilocos Sur

Belt transect method laying 100 meters, one meter on each side where sea cucumbers were gathered. Observations were done monthly in the seagrass, coralline and sandy- muddy areas through wading, snorkeling and diving from October 2009 to September, 2010. Slowly swimming along the belt transect, searching systematically for the target organisms and recorded their occurrences. Since many sea cucumbers are cryptic, searching was done by in crevices, seagrass areas and in the sandy-muddy areas. Sea cucumber found were identified based on their taxonomic resolution feasible using the Conand's FAO specie guide (1998), SPC beche-de-mer ID cards (2004) and Commercial Holothurians of Bolinao, Pangasinan. The animals were left to relax in a plastic container to overcome the error resulting from contraction and relaxation of the body. Number of individuals collected per sites, weight and length measurements were taken. Identification of the sea cucumber species on site was photographed.

Unidentified species were also photographed, collected and brought to laboratory for later identification. External and internal morphology including spicule analysis were also employed as basis for further taxonomic classification. A small portion of the tissue in the dorsal, ventral and tentacles of each individual were taken and washed the tissue with commercial bleach for 30 minutes or until the body wall was dissolved and the spicules have settled on the bottom of the test tube. The solutions from the test tube were pipetted off and adding distilled water to dilute further the mixture letting the spicules to settle at the bottom.

The process was done several times until clean spicules have obtained. The samples were then examined using the trinocular microscope for spicule scanning and taking photograph.

Frequency count, mean and percentages were used in analyzing the data gathered. Relative abundance of the sea cucumber was also analyzed using the formula:

$$\%RA = \frac{\text{Number of Individual}}{\text{Total number of individuals}} \times 100$$

Where: RA is the relative abundance

RESULTS AND DISCUSSION

Composition

Table (I) illustrate the twelve sea cucumber species identified in the four coastal municipalities in Ilocos Sur and Santiago has the highest sea cucumber species present in the area. Five species collected for the whole duration of the study in Narvacan namely; *Actinophyga echinites*, *Holothuria atra H. leucospilota, H scabra* and *Personothuria graeffei*. Seven sea cucumber species gathered in Sta. Maria, *A. echinites, Bohadschia marmorata, H. atra, H. leucospilota, H. impatients, H. fuscocineria and H. scabra*. Same number of species appeared in San Esteban with a commonality of five species but *H. scabra ver. and P. graeffei* were added.

Abundance

Actinophyga echinites, Holothuria atra and *Holothuria leucospilota* were common in the different sampling sites*. A. echinites* with the highest relative abundance of 37.77% and *H. atra* of 36.67%. These two species commonly found in the sandy-muddy/ coralline-rubble with seagrass beds. The abundance of other sea cucumber species was recorded to only attain below 5 percent.

Distribution

The size frequency distribution in terms of weight and length were noticed differently among the sea cucumber species. *Actinophyga echinites* were found the biggest size attained in terms of weight and length during the month of February and *B. marmorata* on the month of June and *P. graeffei* on the months of October.

H. atra also attained the heaviest and biggest peak size in November. This coincide with the study conducted by Conand (1993) reported that G.S.I. increase in October to December with a peak in November collected from the major communities of the New Caledonian lagoon. In general, the gonads of both males and females increase as resulted to the increase in sizes and weight whereby the so-called mature gonads are formed in advance to the spawning season (Abdel-Razek, et.al. retrieved, 2012)

H.leucospilota in July, *H. scabra, H. scabra ver* and *H. coluber* on the month of August. Though these species were collected in the different stations, a common month of biggest and heaviest size distribution was observed for *H. scabra, H. scabra ver and H. coluber*. Such observations implied that succeeding months after the attainment of its optimum average sizes decreases and increases its sizes as the development of gonads also increases thereby increases in length and weight.

H. scabra and *H. scabra ver* are considered with high commercial value, *A. echinites, B. marmorata* and H. atra with medium commercial value and the rest of the species collected has non-commercial value.

Density

Sea cucumber collected in the different sampling sites appeared merely the same and an average density of 14 per 200 square meters or 0.07 individual per square meter. This further implies that all the areas identified in Ilocos Sur, sea cucumber are now depleted.

RESULTS AND DISCUSSION

Table I- Sea Cucumber Composition, Habitat, Relative Abundance and Distribution

SPECIES	ENGLISH NAME	HABITAT	LOCATION									
			N	%RA	SM	%RA	SE	%RA	S	%RA	TOTAL	%RA	VALUE
1. *Actinophyga echinites*	Brown Beauty	Coralline-rubble with seagrass beds	152	58.24	67	25.67	12	4.59	30	11.49	261	37.77	MV
2. *Bohadschia marmorata*	Chalkfish	Sandy-muddy rubble substrate/seagrass beds	-	-	3	9.38	16	50.00	13	40.63	32	4.63	MV
3. *Holothuria atra*	Black Beauty	Seagrass/sandy or rubble substrate	4	5.53	78	30.83	106	41.90	65	25.69	253	36.67	MV
4. *Holothuria coluber*	Snakefish	Coralline substrate	-	-	-	-	-	-	3	100	3	0.43	LV
5. *Holothuria leucospilota*	White threadsfish	Coralline-rubble/sandy-muddy with seagrass beds	2	7.14	8	28.57	8	28.57	10	35.71	28	4.05	VLV
6. *Holothuria impatient*	Impatient Sea cucumber	Coralline0rubble substrate	-	-	1	50.00	-	-	1	50.00	2	0.29	VLV
7. *Holothuria fuscocineria*	Variegated Sea Cucumber	Coral crevices along seagrass beds	-	-	1	11.11	-	-	8	88.89	9	1.30	NCV
8. *Holothuria inhabilis*	Sandy Sea Cucumber	Coralline substrate/seagrass beds	-	-	-	-	-	-	16	100	16	2.32	VLV
9. *Holothuria rigida*	Rigid Sea Cucumber	Sandy-muddy/seagrass beds	-	-	-	-	-	-	9	100	9	1.30	NCV
10 *Holothuria scabra*	Sandfish	Sandy-muddy of seagrass beds	-	-	3	9.09	24	72.73	6	18.18	33	4.78	HV
11. *Holothuria scabra ver*	Golden sandfish	Sandy-muddy of seagrass beds	1	2.63	-	-	35	92.11	2	5.26	38	5.50	HV
12. *Peasonothuria*	Blackspotted	Coralline substrate	2				1		4		7	1.01	

graeffei	Sea Cucumber					
	TOTAL	**16 1**	**16 1**	**20 2**	**16 7**	**691**
	Density/m2	**0.0 7**	**0.0 7**	**0.0 8**	**0.0 7**	**0.07 (ave**

Legend: N = Narvacan SM = Sta. Maria SE = San Esteban S = Santiago %RA = Percent Relative Abundance

HV = High Value MV = Medium Value MV = Medium Value HV = High Value

CONCLUSION

Twelve sea cucumber species distributed in the four coastal municipalities in Ilocos Sur and Santiago as the most dense area. *A echinites* is the most common species found and attained the highest relative abundance in all the stations. Size distribution varies on the different species and month of collections. Most commercially important species attained bigger sizes, found in deeper areas and low density appeared as indication of depleted sea cucumber wildstock in Ilocos Sur. Thereby needs to regulate and rehabilitate to sustain its natural stock.

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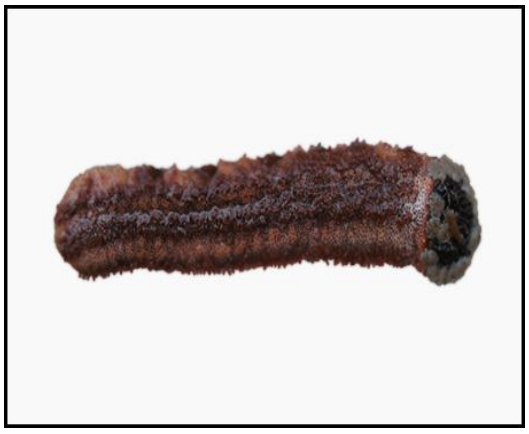
APPENDICES

Holothuria coluber

Pearsonothuria graeffei



Holothuria scabra

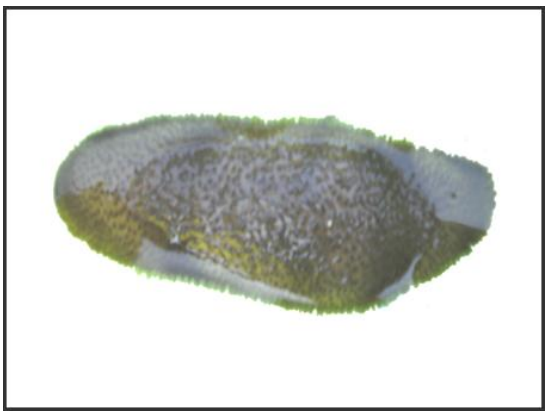
Holothuria leucospilota

Holothuria fuscucineria

Holothuria atra

Actinophyga echinites

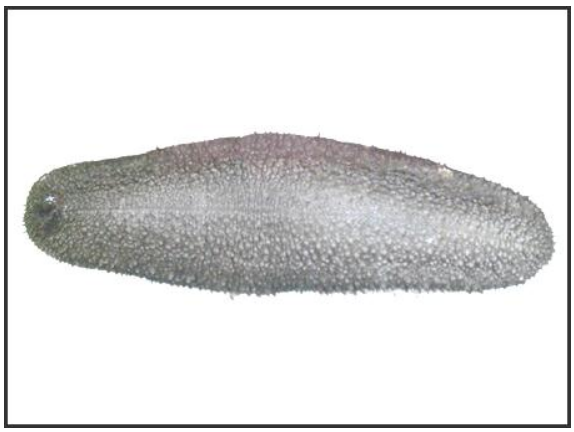
Bohadschia marmorata



Holothuria impatient

Holothuria inhabilis

Holothuria scabra ver



Holothuria rigida