

Some data on the diversity and sexual maturity of sea cucumbers in the mangroves of Babatngon, Leyte Province, Philippines

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Abstract

This study was conducted from August 2012 to January 2013 and assessed sea cucumbers in mangroves of Babatngon, Leyte Province in the Philippines. Species diversity, length-weight relationship, gonadal development and gut content data were recorded. In total, 104 individuals were collected within a total area of 1,800 m² and five species were identified: *Holothuria leucospilota*, *H. atra*, *H. impatiens*, *H. verrucosa* and *H. erinaceus*. The population density of sea cucumbers in Babatngon reached 0.058 m⁻². Only 54.7% of the 24 dissected specimens had gonads with a gonad index ranging from 0.55–33.38, and 5 of these specimens were males in the maturing stage. Gut contents, which were very similar to the substrate, comprised silt and sand with shell and seaweed fragments.

Introduction

For almost a century, the harvesting and processing of sea cucumbers has become a source of income for many Filipinos (Schoppe 2000). The Philippines has now become the second major producer and exporter of dried sea cucumber in the world (Purcell et al. 2013). Residents from the study area claimed there has been a drastic decrease in the abundance of sea cucumbers compared with three decades ago. There was also a time when a purposive and selective collection was carried out using compressors (*hookah*) that eventually led to the total ban of sea cucumber fishing in Babatngon. The present study developed an inventory of sea cucumber species, along with their ecology and biology, found in selected mangrove areas of Babatngon.

Materials and methods

The study covered the shallow waters of the mangroves of Babatngon in Leyte Province, Philippines. Specimen collections were done at three sampling stations from three different areas — Sangputan, District 1 and Uban (Fig. 1). These sites were chosen to represent the different waters geographically surrounding Babatngon. The areas were alternately visited twice so that each station was sampled during the dry and wet seasons. Three 100 m² (50 m x 2 m) belt transects per sampling station were laid in parallel because the mangrove forest width is < 20 m. A 20-m gap was also established between transects to avoid

pseudo-replication. Coordinates of the sampling stations were acquired using the Garmin 76 Global Positioning System Receiver Unit and plotted with the GIS software Manifold 8.0. Photographs of the sampling sites were taken using Panasonic Lumix DMC-TS3 for further site description.

Sea cucumbers were collected seasonally from the three areas, from August 2012 to January 2013. Each area was sampled on a different month and was resampled after three months. Specimen collection was conducted during night time. For each 100 m² belt, all sea cucumber specimens encountered were collected and placed in plastic bags. They were then transported and immersed for 10 minutes in 5% MgCl₂ solution for relaxation and anaesthesia (Ahmed 2009). Temperature, substrate type and salinity were also recorded.

The length, width and weight were measured along with the number of tentacles. Morphology of the sea cucumbers was observed, noted and photographed. A maximum of three individuals per species were preserved in 70% ethanol and brought to the laboratory for further analysis. The remaining specimens were returned to the area where they were collected from.

Some specimens were dissected to obtain gonad weight. The gonad staging was based from the macro- and microscopic features such as gonad colour, thickness, shape, length, and diameter of tubules. The stages were classified as immature,

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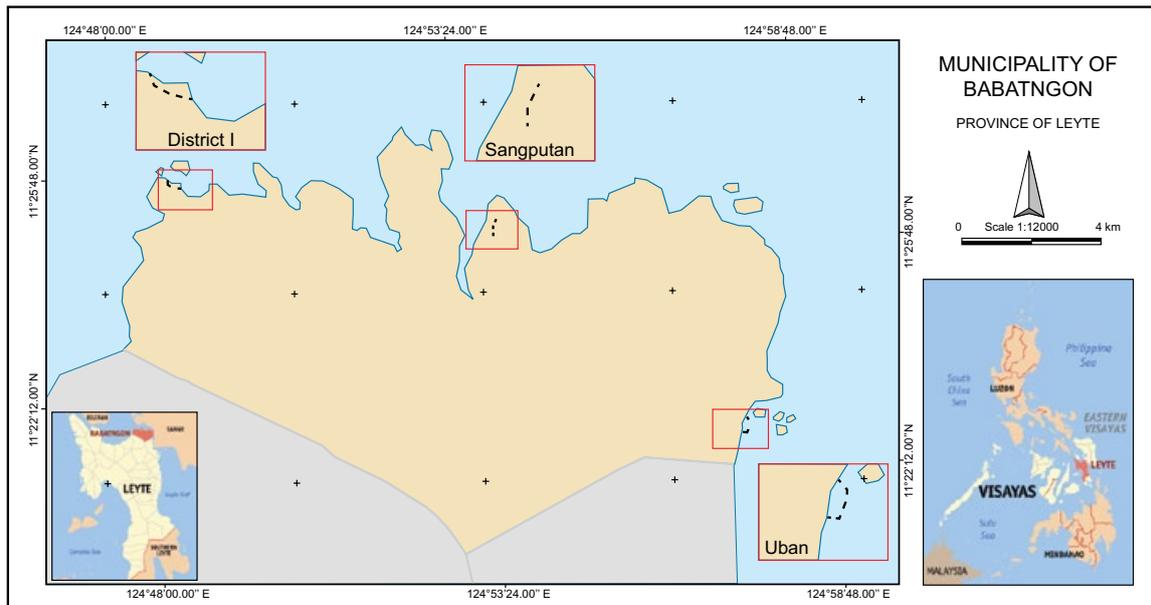


Figure 1. Location of the sampling stations along with their 50-m transect lines in the mangrove ecosystem of Babatngon, Leyte Province, Philippines.

maturing, ripe, and spent (Hoareau and Conand 2001). The identification of the species was done by examining their morphological features (tentacles, warts, papillae) and calcareous spicules.

Results and discussion

In total, five sea cucumber species (*Holothuria leucospilota*, *H. impatiens*, *H. atra*, *H. verrucosa* and *H. erinaceus*) were collected, observed, and evaluated from Sangputan, Uban and District I of Babatngon. Table 1 lists the five species collected from the three areas with their corresponding counts per sampling. The most frequently found species was *H. erinaceus* with 81 individuals collected from Uban (32 and 54 individuals for the first and second sampling, respectively). The least frequently observed species was *H. atra*, found only in Uban, with only 2 counts of the total population.

Sangputan and District I were the only sites that had a common sea cucumber species, *Holothuria leucospilota*. This can be attributed to the prevalence of rocks and crevices, which are used by this species as hiding places. Both Sangputan and District I sites are near coral reefs. Uban is adjacent to seagrass beds, and has the greatest concentration of silt and fewer coarse components.

Specimens found in Uban had fine substrate (e.g. silt and fine sand) in their gut. *H. atra*, a ubiquitous species, is typically found on bare sediment, reef flats and seagrass beds (Kerr et al. 2006). *H. verrucosa* is a cryptic species collected insites from Uban, which offer blocks and crevices that are preferred by this species (Conand 1989).

Table 2 shows the average weight and length of the three species that were present in the two sampling collections of each area. *Holothuria leucospilota* had the highest average weight and length of 301 g and 37 cm, while *H. erinaceus* had the least at 50 g and 17 cm.

The gonad index (GI) is used to measure the sexual maturity (Table 3). Twenty-four individuals were dissected and 46% had no gonads. Furthermore, the only female *H. leucospilota* was collected from Sangputan and District I during the months of August and September, respectively. The maturity stage with the greatest frequency was the maturing (male), totalling five or 38% of the dissected specimens with gonads. *H. leucospilota* from Sangputan and District I showed a decrease of GI from 10.167 (August) to 0.554 (November) and from 29.647 (September) to 18.847 (December). *H. impatiens*, however, showed an increase of GI from 12.205 (September) to 22.877 (December).

From Table 3, it can be observed that of the 24 dissected specimens, 11 had no gonads, 10 were male and only 3 were female. This is far from the expected sex ratio of 1:1 of many holothurian species (Hassan 2005). From the data it can be assumed that *H. leucospilota* was already ripe during August–October 2012 and started spawning by November, while *H. impatiens* was still maturing from August–October 2012 and started to ripen by December. No conclusion can be drawn for the species *H. verrucosa* and *H. erinaceus* because they were only encountered once and no trend can be assumed. *H. verrucosa* had maturing gonads in August 2012, and *H. erinaceus* was maturing to ripe in January 2013.

Table 1. Sea cucumber species observed in mangrove areas at different sampling stations at Babatngon in Leyte Province, Philippines from August 2012–January 2013 (n = 104).

Species	Sangputan		District I		Uban		n	%
	August	November	September	December	October	January		
<i>Holothuria leucospilota</i>	1	3	3	2	-	-	9	8
<i>Holothuria impatiens</i>	-	-	1	8	-	-	9	9
<i>Holothuria atra</i>	-	-	-	-	2	-	2	2
<i>Holothuria erinaceus</i>	-	-	-	-	27	54	81	78
<i>Holothuria verrucosa</i>	-	-	-	-	3	-	3	3
Total	1	3	4	10	32	54	104	100

Table 2. Minimum, maximum and mean measurements for both the weight and length of all the species found at Babatngon, Leyte Province, Philippines.

Species	Weight (g)			Length (cm)		
	Min	Max	Mean	Min	Max	Mean
<i>Holothuria leucospilota</i>	155	598	301	23	65	37
<i>Holothuria impatiens</i>	67	189	139	18	39	32
<i>Holothuria atra</i>	95	113	104	24	28	26
<i>Holothuria verrucosa</i>	68	102	90	13	31	20
<i>Holothuria erinaceus</i>	17	169	50	11	29	17

Table 3. Sex, stage, gonad index (GI), gonad colour, length and diameter of tubules of dissected specimens.

Station	Species	Month	Colour	Sex	GI	Length (mm)	Diameter (mm)	Maturity stage*
Sangputan	<i>Holothuria leucospilota</i>	August	Y	F	10.17	110	1.15	3
		November	Y	M	0.55	150	1.06	4
		September	W	F	25.92	160	1.02	3
			W	M	33.38	180	0.86	3
		December	W	M	18.85	144	0.54	3
District I	<i>Holothuria impatiens</i>	September	W	M	12.21	56	0.83	2
		December	W	M	19.2	63	0.52	3
			W	M	31.73	68	0.85	2
			W	M	17.7	66	1.08	3
Uban	<i>Holothuria verrucosa</i>	October	W	M	14.56	40	0.51	2
			W	M	28.42	45	0.67	2
	<i>Holothuria erinaceus</i>	January	W	M	19.1	90	0.75	3
			W	M	16.41	90	0.66	2

* Maturity stages are: 1 = immature, 2 = maturing, 3 = ripe, 4 = spent.

Acknowledgements

Thanks are due to Dr Frank Rowe, Dr Nahla Omran for verifying and identifying the sea cucumber specimens; Ronald Dionnie D. Olavides,

Christine Edullantes and Inggat Laya Casilagan of the University of the Philippines Marine Science Institute for giving input to the identification of the sea cucumber species; and to Mr Victor A. Romero and Mrs Evelina M. Romero.

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