Community Structure of Molluscs in Northern Samar, Philippines

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Abstract: This study was conducted to determine the species composition, community structure, species diversity, and economic uses to the people living in the coastlines of Northern Samar, Philippines. Sampling was done during the low tides of the day in the three areas of the province, namely: Balicuatro Area, Central Area, and Pacific Area. Environmental conditions were also studied, which included the water pH, temperature, salinity, depth, and substrate. Reconnaissance survey was conducted first before the actual sampling was done. In each of the area, three representative municipalities that have muddy, sandy and rocky substrates were included. The systematic quadrat sampling technique was used in gathering the specimens. A 100m transect line was laid out from the intertidal to subtidal zones (from landward to seaward) of the coastlines. From there, five quadrats of 1 sq m with intervals of 20m were established. All mollusc species within the quadrat were counted and identified. Representative samples were taken to the laboratory for further authentication and preservation. The specimens were boiled and the meat was removed. The shells were air dried and were placed in display boxes for the biological collection. Residents in the coastlines were interviewed using interview guide translated to Samarnon dialect about the economic uses of molluscs. The molluscs belonged to 2 classes, 2 sub-classes, 7 orders, 4 sub-orders, 30 super families, 50 families, 1 sub-family, and 100 genera. Family *Conidae* has the highest number of collected species, followed by family *Cypraeidae*, and family *Strombidae*. *Cerithium tenellum* Sowerby has the highest density, frequency, importance value and ecological importance; i.e. this species can be found in all the areas of the province. Balicuatro Area had the highest number of mollusc species collected. The species diversity using the Shannon Index is 6.93, which showed a high species diversity index for a real community. Molluscs can inhabit very well in rocky substrates; deeper waters; neutral pH; higher temperatures and higher salinity levels. The type of substrates have influenced the abundance, distribution, and species diversity. There is a high species diversity of mollusc fauna in the province. They are used for food, shell craft industry, i.e. wall and hanging decorations, jewelry, etc., medicinal uses, i.e. laxative, lime, etc., for biological studies, and for ethnozoological uses, i.e. used in rites, rituals, customs and traditions of the people.

*Keywords:* community structure, molluscs, diversity, substrate, abundance.

I.   INTRODUCTION

Molluscs have soft bodies consisting of an anterior head, ventral foot, and dorsal visceral mass. They are of wide distribution in time and space. They show adaptations to many habitats [1]. Southeast Asia has an abundance marine shells with the largest number of species in the world [2]. The Philippines has continued to this day to be the subject of investigations on biodiversity albeit on sporadic basis. The southern regions are no exception. Although the attention given to them is usually not proportionate to the rich resources which are actually there [3]. As an archipelagic country, the Philippines is blessed with aquatic resources [4]. An accurate knowledge of the distribution patterns of molluscan species is important in the establishment of biological and taxonomic relationships between closely allied taxa. It is somewhat unfortunate that the distribution patterns of a large number of Philippine molluscs is lacking, and the little that is known is in many cases fragmentary [5].

II. METHODOLOGY

A. Locale of the Study:

Northern Samar lies in the North east portion of the island of Samar. It is one of the six provinces comprising Region VIII (Eastern Visayas). The province consists of 24 municipalities; 15 coastal towns, 5 island towns; and 4 interior towns. Catarman is the cpital of Northern Samar. The province is divided into three areas that comprised 5 towns each: Balicuatro Area, Central Area, and Pacific Area [6].
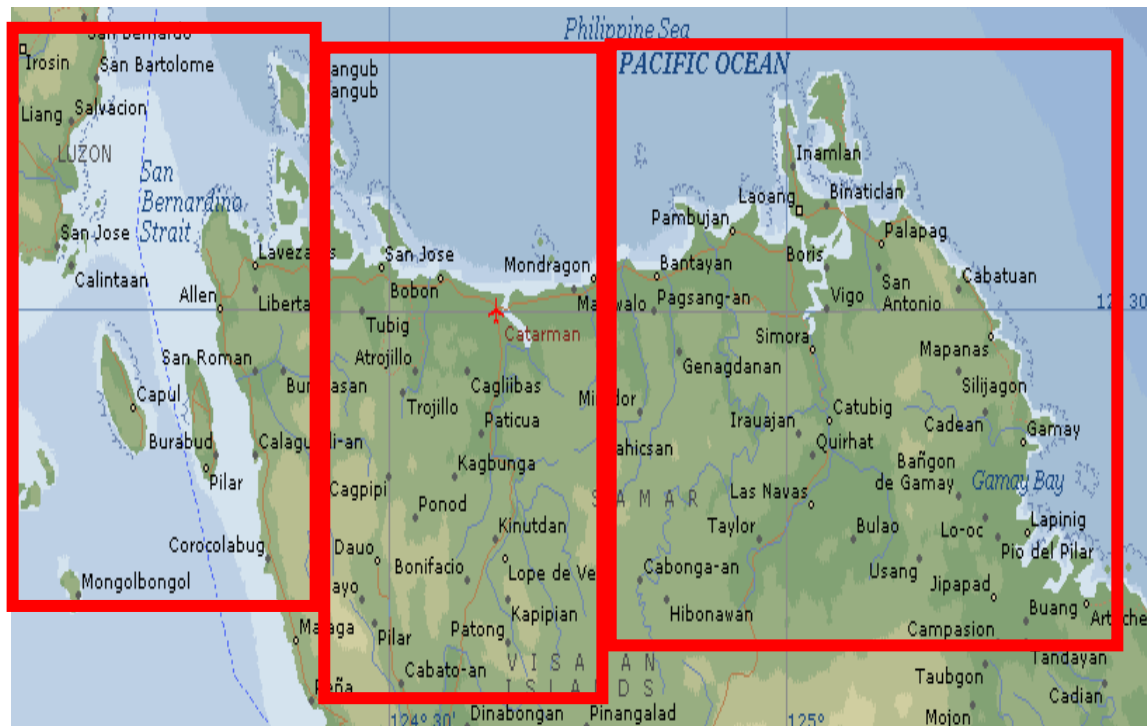
Legend: 1 – Balicuatro Area;   2 – Central Area;   3 – Pacific Area

FIGURE I. LOCATION MAP OF NORTHERN SAMAR

B. Sampling and Data Collection:

A reconnaissance survey was conducted to gather information about the areas being studied and to identify sampling sites. The gathering of specimen was done at low tides during day time. Environmental conditions at the time of sampling were also observed and recorded, i.e. water temperature, pH, depth, salinity, and substrate. A 100m transect line was laid out from the intertidal to subtidal zones (from landward to seaward) of the coastlines. From there, five quadrats of 1 sq m with intervals of 20m were established. All mollusc species within the quadrat were counted and identified. Representative samples were taken to the laboratory for further authentication and preservation. An interview with the local residents was conducted using interview guide translated to Samarnon dialect for the economic uses of molluscs in their place.

C. Identification and Preservation of Specimens:

All the species collected were boiled and meat was removed. The shells were air dried and mounted on display boxes for biological collection. Labels were attached to each specimen. Identification of the specimen was done using reference books and authenticated by the experts in the college.

D. Statistical Treatment of Data:

Several statistical formula were used in coming up with the community structure of molluscs, such as:

1. Density – number of individuals of a species divided by the area sampled.

2. Relative density – density of a species divided by total density of all species times 100.

3. Frequency – number of plots in which species occurs divided by the total number of plots sampled.

4. Relative frequency – frequency of a species divided by total frequency for all species time 100.

5. Abundance – number of individuals of a species divided by total number of individuals in a given area.

6. Relative Abundance – abundance of a species divided by total abundance for all species times 100.

7. Importance value – relative density plus relative frequency plus relative abundance.

8. Ecological contribution – importance value of a species divided by total importance value for all species.

TABLE I. COMMUNITY STRUCTURE OF MOLLUSCS IN NORTHERN SAMAR

species	#invdl	density	Reldensity	frequency	relfrequen	abund	relabund	impvalue	econtrib
(345) Totals	5168	51680	99.64	23.65	99.32	51680	99.64	198.96	199.53

The answers to the interview guide were collected and analyzed using frequency counts, percentages and means. Local names were given by family, the same with the economic uses. Majority of the molluscs were used as food, for shell crafts, for medicinal and biological uses.

TABLE II. MOLLUSC FAMILIES, LOCAL NAME BY FAMILY, AND ECONOMIC USE BY FAMILY

Family (50)	Local Name	Uses
1 Neritidae	Sihi	f, s, m, b,
2 Acmaeidae	Paying-payong	f, s, m, b,
3 Patellidae	Sagipsipon	f, s, m, b,
4 Haliotidae	Lapas	f, s, m, b, e
5 Angariidae	Taktakon	f, s, m, b, e
6 Trochidae	Kadudo	f, s, m, b, e
7 Turbinidae	Taktakon	f, s, m, b, e
8 Mathildidae	Taktakon	s, m, b,
9 Crepidulidae	Taktakon	f, s, m, b, e
10 Cerithiidae	Tap-ungay	f, s, m, b,
11 Potamididae	Bagungon	f, s, m, b,
12 Turritellidae	Bagungon	f, s, m, b, e
13 Cypraeidae	Buskay	f, s, m, b, e
14 Triviidae	Buskay	s, m, b, e
15 Ovulidae	Buskay	f, s, m, b, e
16 Littorinidae	Tipon-tipon	f, s, m, b,
17 Naticidae	Kuhol	f, s, m, b,
18 Strombidae	Sikad-sikad	f, s, m, b, e
19 Cassidae	Budyong	f, s, m, b, e
20 Cymatiidae	Budyong	f, s, m, b, e
21 Tonnidae	Tuyokay	f, s, m, b, e
22 Cancellariidae	Tuyokay	s, m, b, e
23 Conidae	Pulid	s, m, b, e

24	Terebriidae	Pulid	f, s, m, b, e
25	Turridae	Tuhilon	f, s, m, b,
26	Costellarridae	Layag-layag	f, s, m, b,
27	Harpidae	Layag-layag	f, s, m, b, e
28	Mitridae	Layag-layag	s, m, b, e
29	Olividae	Kadudo	f, s, m, b,
30	Turbinellidae	Miyong-piyong	f, s, m, b, e
31	Buccinidae	Budyong	f, s, m, b, e
32	Columbellidae	Budyong	f, s, m, b, e
33	Nassariidae	Nibotibo	f, s, m, b, e
34	Muricidae	Garangan	f, s, m, b, e
35	Bullidae	Sobra-sobra	f, s, m, b,
36	Haminoeidae	Sobra-sobra	s, m, b,
37	Arcidae	Buo	f, s, m, b,
38	Psammobiidae	Tuway	f, s, m, b, e
39	Tellinidae	Tuway	f, s, m, b, e
40	Veneriidae	Bug-atan	f, s, m, b, e
41	Mactridae	Bug-atan	s, m, b,
42	Lucinidae	Bug-atan	f, s, m, b,
43	Tridacnidae	Tilang	f, s, m, b, e
44	Corbiculidae	Tuway	f, s, m, b, e
45	Cardiidae	Tuway	f, s, m, b, e
46	Mytilidae	Tahong	f, s, c, b,
47	Pinnidae	Lapay	f, s, m, b, e
48	Pectinidae	Lapay	f, s, m, b, e
49	Spondylidae	Pukpokon	f, s, m, b, e
50	Anomiidae	Kapis	s, m, b, e

Legend: **f – food;**   **s – shell craft;**   **c – medicinal use;**   **b – biological use;**   **e – ethnozoological use**

III.   CONCLUSIONS

There were 345 molluscs collected that belonged to 2 classes, 2 sub-classes, 7 orders, 4 sub-orders, 30 super families, 50 families, 1 sub-family, and 100 genera. Family *Conidae* has the highest number of collected species, followed by family *Cypraeidae*, and family *Strombidae*. *Cerithium tenellum* Sowerby has the highest density, frequency, importance value and ecological importance; i.e. this species can be found in all the areas of the province. Molluscs can inhabit very well in rocky substrates; deeper waters; neutral pH; higher temperatures and higher salinity levels. The Balicuatro Area had the highest number of species collected. Eleven (11) families had only one representative species collected; namely: families *Patellidae, Mathildidae, Crepidulidae, Turritelidae, Triviidae, Cancellariidae, Turridae, Haminoiedae, Mactridae, Lucinidae, and Corbiculidae.* There is a high species diversity of mollusc fauna in the province. They are used for food, shell craft industry, i.e. wall and hanging decorations, jewelry, etc., medicinal uses, i.e. laxative, lime, etc., for biological studies, and for ethnozoological uses, i.e. used in rites, rituals, customs and traditions of the people.

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