MARINE GASTROPODS AND BIVALVES OF BIRI, NORTHERN SAMAR

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ABSTRACT

A descriptive research was conducted in 2 barangays of Biri, Northern Samar, to describe the species composition of mollusks in the island municipality. Specifically, it aimed to identify the gastropods and bivalves present in the coastal waters of Biri, Northern Samar; to quantify their density and frequency; determine the prevailing environmental conditions in the study area during the day time and night time; and, enumerate the gastropod and bivalve species that are of economic value to the fisherfolks in the sampling sites. In each site, three 100-meter transect lines were laid seaward, with ten 1-square meter quadrats established along each line. All gastropods and bivalves within the quadrats were counted; those outside were not counted, but were listed. Interview with residents for additional information and data was done using a researcher-made interview guide. Results show 26 mollusk species representing 10 genera, 14 families, 5 orders, and 2 classes. In Barangay San Pedro, densest among the species during night time and day time sampling was *Cypraea testunidaria* Linne, while in Barangay San Antonio, densest at night was *Cypraea annulus* Linne, whereas during day time, it was *Turbo (Lunella) cinereus*. The coastal waters of the sampling sites have optimum conditions which favour the existence of gastropods and bivalves, and although variations do occur, such fluctuations are insignificant to affect the frequency and density of these species. This implies that environmental parameters influence the favorable distribution of gastropods and bivalves. Almost all of the gastropod and bivalve species collected were of commercial value – either as food or for handicraft, jewelry, or fashion accessories. It is recommended that similar studies be conducted to validate these findings, generating baseline information on mollusks in other localities of Northern Samar.

KEYWORDS: *gastropods, bivalves, mollusk, Biri, Northern Samar*

INTRODUCTION

Phylum Mollusca, second largest animal phylum, are a diverse group of animals widely distributed in both time and space, having continuous record since Cambrian time, with 45,000 fossil species (Storer, *et al.,* 1979), and having more than 80,000 living species. They are free-living, but slow-moving, creatures with close association to the substrate. Some attach to rocks, shells, or wood; some burrow; others float; while others can swim freely. Of major economic importance are clams, scallops, oysters, squids, and octopi that serve as human food, and a few bivalves that produce pearls (Storer, *et al.*, 1979).

This undertaking hopes to provide the community with an accurate knowledge of the gastropod and bivalve species present in the coastal waters of Biri, Northern Samar with high potential for the export market overseas. It would also serve as an update on the status of these species, in terms of its density, frequency, and the prevailing environmental conditions such as water temperature and pH, salinity, depth, current, and substrate.

Myers and Burch (2001) report that most gastropods have a single, usually spirally coiled shell into which the body can be withdrawn, but the shell is lost or reduced in some important groups. Torsion or twisting occurs in most snails, many of which have an operculum that seals the shell opening when the snail's body is drawn into it. They have a muscular foot for locomotion, are dioecious, while some are hermaphroditic, producing veliger larvae. Gastropods abound in saltwater, freshwater, and on land occurring in tropical to subpolar regions, down to depths of 5,200 meters at sea and up to 5,500 meters above sea level (Storer, *et al*., 1979).

Many snails are necessary intermediate hosts for trematode flatworms, but univalves have long served as human food and their shells provide the money of various native peoples (Storer, *et al*., 1979).

Bivalves possess two shells secreted by a mantle extending in a sheet on either side of the body, are joined at the dorsal end by a ligament comprised of a *tensilium* and a *resilium,* which together open the shells at rest, and closes them by contracting its powerful adductor muscles (Kellogg and Faustin, 2002).

Their bodies are laterally compressed, and uses its muscular foot either to attach itself to a substrate, or to burrow. Most bivalves are filter feeders, but some are scavengers, or even predators. However, bivalves are the only molluscan class without a radula.

Most bivalves (clams and oysters) are used as food in places the world over. Pearl oysters are used for commercial pearl production, but some species can cause economic damage, such as being serious parasites of fish (freshwater mussels) or boring through wood, damaging wooden ships, pilings, or other wood structures (in marine species) [Kellogg and Faustin, 2002].

Storer, *et al*., (1979) also report that bivalves are the second largest molluscan

class, with about 20,000 species, widely distributed in both fresh and salt waters. However, they do not display the great adaptive radiation found in gastropods, and most are sessile or sedentary burrowing animals, filtering food particles from the water or sediment.

Melendres (2009) cites Nishida, *et al*., (2000) claiming that mollusks must possess good quality standards for meat and appearance (condition index or fattening index) as evaluation method for estimating meat amount in relation to shell cavity.

Parent (2008) stated that mollusks are good barometers of environmental health. They also produce a wide range of biotoxins and metabolites used in medical research.

Calumpiano and Galenzoga (1999) reported 23 molluscan species, all of which were identified by fisherfolks to have commercial value other than food. Galenzoga (2002) collected 345 molluscan species, 320 of which were edible and 25 were poisonous, but all were of commercial application as lime, fixative, medicine, or in shell craft as wall decors or jewelry.

Previous studies on mollusks in Biri, Northern Samar done by Galvez (2012) and Batula (2017), reveal that species collected were edible and were of commercial value to the fisherfolks in the coastal communities.

METHODOLOGY

Locale of the Study

Two randomly selected barangays of the island municipality of Biri, located at the tip of the province of Northern Samar, facing the deep blue Pacific Ocean and the famous San Bernardino Strait, were the collection sites for this study (MPDC, 2010).

Research Design and Sampling Technique

Descriptive research, with interviews from randomly selected residents using a researcher-made interview guide, was done to gather data on the economic importance of mollusks. In the collection of specimens, systematic quadrat sampling during low tide was done at daytime and at night.

Data Gathering Procedure

Three 100-meter transect lines, distanced 50 meters apart, were laid down seaward. Along each transect, 1 m^2 quadrats at 10-meter intervals were established, and all gastropods and bivalves found were counted and identified. Those outside the quadrat were not counted, but were included in the list of species recorded in the site. Interviews with local residents were made to determine how gastropods and bivalves were utilized in the study area.

Identification and Preservation of Specimens

Collected samples were brought to the College of Science for classification and identification. Most of the specimens were boiled to remove the meat, others were buried in ants' nest, and the shells were

cleaned thereafter and arranged in a display case.

Determination of Environmental Parameters

Water temperature, pH, salinity, current, depth, and substrate type were measured and/or observed during each sampling visit, using standard measuring devices such as the refractometer, pH meter, and meter stick.

RESULTS AND DISCUSSION

Gastropod and Bivalve Species in Biri, Northern Samar

From the results, it can be gleaned that 26 species, belonging to 10 genera, 14 families, and 5 orders, were collected and identified in the two island barangay sampling sites.

Table 1. Gastropod and Bivalve Species in Two Barangays of Biri, Northern Samar

Class	Order	Family	Species
Bivalvia	Mytiloida	Pteriidae	*Pinctada margaritifera* L.
		Rectinidae	*Comptopallum radula*
	Veneroida	Cardiidae	*Fragum unedo* L.
		Tridacnidae	*Tridacna gigas* L.
Gastropoda	Archaeogastropoda	Haliotidae	*Haliotis asinina* L.
		Turbinidae	*Turbo (Marmarostoma) bruneus* Linne
			T. (Lunella) cinereus Linne
		Neritidae	*Nerita (Retina) undata* Linne
		Trochidae	*Trochus maculatus* Linne
			Tectus fenestratus Linne
			Monodonta labio Linne
		Angariidae	*Angaria delphinus* Linne
	Mesogastropoda	Cypraeidae	*Cypraea annulus* Linne
			C. felina Gmelin
			C. tigris Linne
			C. mappa Linne
			C. testudinaria L.
			C. talpa Linne
			C. erosa Linne
		Strombidae	*Strombus labiatus labiatus* Linne
			S. (Canarium) urceus urceus L.
			Lambis lambis L.
		Neritidae	*Nerita (Theliostyla) planospira*
		Cassidae	*Phalium glaucum* L
		Cymatiidae	*Charonia tritonis tritonis*
	Neogastropoda	Volutidae	*Cymbiola vespertilio* Linne

Plate 1. *Haliotis asinina* Linne 1758

Plate2. *Nerita (Theliostyla) planospira* Anton 1839

Plate 3. *Turbo(Marmarostoma) bruneus* Roding 1798

Plate 4. *Lambis lambis* Linne 1758

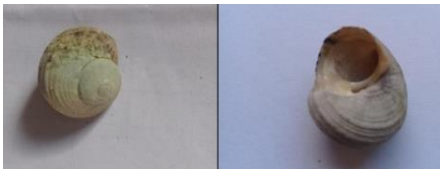

Plate 5. *Turbo (Lunella) cinereus* Born 1778


Plate 6. *Trochus maculatus* Linne 1758


Plate 7. *Strombus (Canarium) urceus urceus* Linne 1758


Plate 8. *Strombus (Canarium) labiatus labiatus* Roding 1798


Plate 9. *Tectus fenestratus* Gmelin 1791


Plate 10. *Nerita (Retina) undata* Linne 1758


Plate 11. *Angaria delphinus* Linne 1758


Plate 12. *Cypraea tigris* Linne 1758


Plate 13. *Cypraea erosa* Linne 1758


Plate 14. *Cypraea annulus* Linne 1758


Plate 15. *Cypraea mappa* Linne 1758


Plate 16. *Cypraea testudinaria* Linne 1758


Plate 17. *Monodonta labio* Linne 1758


Plate 18. *Cypraea talpa* Linne 1758


Plate 19. *Cypraea felina* Gmelin 1791


Plate 20. *Phalium glaucum* Linne1758


Plate 21. *Cymbiola vespertilio* Linne1758


Plate 22. *Tridacna gigas* Linne 1758


Plate 23. *Charonia tritonis tritonis* Linne1758


Plate 24. *Pinctada margaritifera* Linne 1758


Plate 25. *Fragum unedo* Linne1758


Plate 26. *Comptopallum radula*

In terms of the presence or absence of these species in the study area, results show that most of them were present in both sites, except for *Haliotis asinina*, *Phalium glaucum, Tridacna gigas, Charonia tritonis tritonis,* and *Pinctada margaritifera* which were absent in Barangay San Pedro, Biri, Northern Samar.

During the full moon, at night when the tide was low, the most dense species in Barangay San Antonio, Biri, Northern Samar was *Cypraea annulus* Linne (2 individuals/m^2), while the least dense was *Haliotis asinina* Linne, with an average density of 0.13 individual/m^2. During the same period, in Barangay San Pedro, Biri, Northern Samar, the most dense species was *Cypraea testudinaria* Linne (3.06 individuals/m^2), and the least dense was *Monodonta labio* Linne at a density of 0.4 individual/m^2.

At low tide during daytime, the densest of the species was *Turbo (Lunella) cinereus* (2.21individulas/m^2), while the least dense was *Haliotis asinina* Linne (average of 0.06 individual/m^2) in Barangay San Antonio, Biri, Northern Samar. In the same period, in Barangay San Pedro, Biri, Northern Samar, the densest of the specimens collected was *Cypraea testudinaria* Linne at 3.18 individuals/m^2, while the least dense was *Trochus maculatum* Linne, with a density of only 0.08 individual/m^2.

In terms of the frequency of their occurrence in Barangay San Antonio, Biri, Northern Samar, the most frequently encountered at low tide during the full

moon were *Turbo (Lunella) cinereus* and *Cypraea annulus* Linne, with a frequency value of 0.74 and a relative frequency of 7.06%. The least frequent was *Haliotis asinina* Linne (F = 0.40; RF = 1.05%). During the same period, in Barangay San Pedro, Biri, Northern Samar, the most frequent was *Cypraea testudinaria* Linne (F = 0.98) with a relative frequency of 9.61%, while the least frequently appearing was *Cypraea talpa* Linne, with a frequency of 0.10 or a relative frequency of 0.98%.

Sampling made at day time, during low tide, in Barangay San Antonio, Biri, Northern Samar, the most frequently encountered species were *Turbo (Lunella) cinereus* and *Cypraea annulus* Linne, with a frequency value of 0.76 (RF = 7.52%), while the least frequent was *Haliotis asinina*, with a frequency of 0.06 (RF = 0.59%). In the same time period, in Barangay San Pedro, Biri, Northern Samar, the most frequently observed species was *Cypraea testudinaria* Linne with a frequency of 0.78 (RF = 8.84%), whilethe least frequent was *Trochus maculatus* Linne, with a frequency of 0.08 (RF= 0.91%).

Table 2. Density and Relative Density of Gastropods and Bivalves in Biri, Northern Samar at Low Tide

Species	Full Moon						Day Time					
	Barangay San Antonio			Barangay San Pedro			Barangay San Antonio			Barangay San Pedro		
	T	D (÷90 m^2)	RD (%)	T	D (÷90 m^2)	RD (%)	T	D (÷90 m^2)	RD (%)	T	D (÷90 m^2)	RD (%)
Haliotis asinina	12	0.13	0.54	-	-	-	5	0.06	0.30	-	-	-
Nerita (Theliostyla) planospira	93	1.03	4.29	69	0.77	3.79	95	1.06	5.26	65	0.72	3.73
Turbo (Marmarostoma) bruneus	101	1.12	4.66	101	1.12	5.52	105	1.17	5.81	110	1.22	6.32
Lambis (Lambis) lambis Linne	76	0.84	3.50	31	0.34	1.67	37	0.41	2.04	25	0.28	1.45
Turbo (Lunella) cinereus	161	1.79	7.46	143	1.59	7.83	199	2.21	10.97	149	1.66	8.60
Trochus maculatus Linne	26	0.29	1.21	11	0.12	0.59	12	0.13	0.65	7	0.08	0.41
Strombus (Canarium) urceus urceus L	60	0.67	2.79	85	0.94	4.63	66	0.73	3.62	71	0.79	4.09
S. labiatus labiatus	107	1.19	4.96	82	0.91	4.48	84	0.93	4.62	78	0.87	4.51
Tectus fenestratus Gmelin	159	1.77	7.37	135	1.50	7.39	137	1.52	7.55	125	1.39	7.20
Nerita (Retina) undata Linne	111	1.23	5.12	120	1.33	6.55	90	1.00	4.97	126	1.40	7.25
Angaria delphinus Linne	145	1.61	6.71	99	1.10	5.42	86	0.96	4.76	107	1.19	5.17
Cypraea tigris Linne	107	1.19	4.96	50	0.56	2.76	83	0.92	4.57	44	0.49	2.54
C. erosa Linne	90	1.00	4.16	142	1.58	7.78	98	1.09	5.41	95	1.06	5.49
C. annulus Linne	180	2.00	8.33	123	1.37	6.75	151	1.68	8.34	130	1.44	7.46
C. mappa Linne	60	0.67	2.79	39	0.43	2.12	33	0.37	1.84	30	0.33	1.71
C. testudinaria Linne	98	1.09	4.54	275	3.06	15.07	94	1.04	5.16	286	3.18	16.48
Monodonta labio Linne	55	0.61	2.54	36	0.40	1.97	50	0.56	2.78	32	0.36	1.87
Cypraea talpa Linne	29	0.32	1.33	11	0.12	0.59	17	0.19	0.94	10	0.11	0.51
C. felina Linne	74	0.82	3.42	38	0.42	2.07	68	0.76	3.77	51	0.57	2.95
Cymbiola vespertilio Linne	98	1.09	4.54	65	0.72	3.55	71	0.79	3.92	57	0.63	3.26
Pinctada margaritifera Linne	90	1.00	4.16	103	1.14	5.62	76	0.84	4.17	75	0.83	4.30
Fragum unedo Linne	110	1.22	5.08	67	0.74	3.65	72	0.80	3.97	61	0.68	3.52
Comptopallum radula	120	1.33	5.54	-	-	-	83	0.79	3.92	-	-	-
TOTAL	**2,162**	**24.01**	**100.0**	**1,825**	**20.30**	**99.80**	**1,813**	**20.14**	**99.90**	**1,734**	**19.30**	**99.80**

Legend: T = Total D = Density RD = Relative Density

Table 3. Frequency and Relative Frequency of Gastropods and Bivalves in Biri, Northern Samar at Low Tide

Species	Full Moon						Day Time					
	Barangay San Antonio			Barangay San Pedro			Barangay San Antonio			Barangay San Pedro		
	T	F (÷90)	RF (%)	T	F (÷90)	RF (%)	T	F (÷90)	RF (%)	T	F (÷90)	RF (%)
Haliotis asinina	10	0.11	1.05	-	-	-	5	0.06	0.59	-	-	-
Nerita (Theliostyla) planospira	40	0.44	4.19	42	0.47	4.61	57	0.63	6.24	20	0.22	2.49
Turbo (Marmarostoma) bruneus	28	0.31	2.96	29	0.32	3.14	19	0.21	2.08	30	0.33	3.74
Lambis (Lambis) lambis Linne	34	0.38	3.63	21	0.23	2.25	17	0.19	1.88	16	0.18	2.04
Turbo (Lunella) cinereus	67	0.74	7.06	65	0.72	7.06	68	0.76	7.52	67	0.74	8.39
Trochus maculatus Linne	20	0.22	2.09	10	0.11	1.08	12	0.13	1.29	7	0.08	0.91
Strombus (Canarium) urceus urceus L	36	0.40	3.82	51	0.57	5.59	35	0.39	3.86	39	0.43	4.88
S. labiatus labiatus	51	0.57	5.44	55	0.61	5.98	48	0.53	5.25	45	0.50	5.67
Tectus fenestratus Gmelin	57	0.63	6.01	59	0.66	6.47	64	0.71	7.03	56	0.62	7.03
Nerita (Retina) undata Linne	55	0.61	5.82	65	0.72	7.06	49	0.54	5.35	63	0.70	7.94
Angaria delphinus Linne	64	0.71	6.77	51	0.57	5.59	61	0.68	6.73	53	0.59	6.69
Cypraea tigris Linne	60	0.67	6.39	32	0.36	3.53	52	0.58	5.74	35	0.39	4.42
C. erosa Linne	25	0.28	2.67	56	0.62	6.08	29	0.32	3.17	21	0.23	2.61
C. annulus Linne	67	0.74	7.06	63	0.70	6.86	68	0.76	7.52	63	0.70	7.94
C. mappa Linne	32	0.36	3.44	27	0.30	2.94	23	0.26	2.57	26	0.29	3.29
C. testudinaria Linne	46	0.51	4.87	88	0.98	9.61	50	0.56	5.54	70	0.78	8.84
Monodonta labio Linne	20	0.22	2.09	20	0.22	2.16	21	0.23	2.28	20	0.22	2.49
Cypraea talpa Linne	19	0.21	2.00	9	0.10	0.98	13	0.14	1.39	12	0.13	1.47
C. felina Linne	14	0.16	1.53	29	0.32	3.14	38	0.42	4.16	44	0.49	5.56
Cymbiola vespertilio Linne	48	0.53	5.06	45	0.50	4.90	40	0.44	4.36	39	0.43	4.88
Pinctada margaritifera Linne	49	0.54	5.15	57	0.63	6.18	47	0.52	5.15	35	0.39	4.42
Fragum unedo Linne	45	0.50	4.77	44	0.49	4.80	39	0.43	4.26	34	0.38	4.71
Comptopallum radula	58	0.64	6.11	-	-	-	51	0.57	5.64	-	-	-
TOTAL	**945**	**10.48**	**99.90**	**918**	**10.20**	**100.0**	**906**	**10.10**	**99.60**	**795**	**8.82**	**100.0**

Legend: T = Total F = Frequency RF = Relative Frequency

Table 4. Average Environmental Parameters in the Study Area over Three Months (Low Tide at Full Moon)

Sampling Area	Water pH	Water Temperature (°C)		Salinity (ppt)	Current Speed (m/s)		Depth (inches)		Substrate
		Day	Night		Day	Night	Day	Night	
San Antonio	8.0	30.2	20.4	34.3	0.084	0.076	4	3.8	Rocky, corally, or sandy with sea grass beds
San Pedro	8.1	29.3	20.8	34.5	0.078	0.078	5	4.3	

From Table 4, it can be gleaned that most of the parameters observed and measured were within the optimum values necessary for gastropods and bivalves to exist. Although variations do occur, they are very slight fluctuations which do not seriously affect the frequency and density of these species.

Presented in the succeeding table is the commercial value of gastropods and bivalves to the residents in the study area. Data show that almost all of the species collected were commercially important as

their flesh are consumed as food, while the shells are used by local craftsmen for the manufacture of decors, jewelry items or accessories like necklaces and bracelets which are sold locally or exported to other provinces in the country.

CONCLUSION

Although only 26 species belonging to 5 orders, 14 families, and 10 genera is reported in this study, and represents only a small fraction of the total number of species reported in the country, it is concluded that the Municipality of Biri, Northern Samar has a diversity of gastropods and bivalves. The environmental parameters measured have been found to be within the optimum range that is favourable to the existence of gastropods and bivalves in the study area. Almost all of these species have commercial value in the locality.

RECOMMENDATIONS

The researchers recommend the validation of the present findings to verify and gain more baseline data on gastropods and bivalves in other coastal communities in the province of Northern Samar. Sampling at high tide and during different phases of the moon may also be done.

Species	Local Name	Commercial Value
Haliotis asinina	Lapas	The flesh is eaten as food, while the shells are used in shellcraft, and transformed by local craftsmen into hanging decors, jewelry items, and/or accessories like bracelet or necklaces.
Nerita (Theliostyla) planospira	Sihi	
Turbo (Marmarostoma) bruneus	Taktakon	
Lambis (Lambis) lambis Linne	Sahang	
Turbo (Lunella) cinereus	Lumban	
Trochus maculatus Linne	Dodo-dodo	
Strombus (Canarium) urceus urceus Linne	Sikad-sikad	
S. labiatus labiatus	Sikad-sikad	
Tectus fenestratus Gmelin	Dodo-dodo	
Nerita (Ritena) undata L.	Sihi	
Angaria delphinus Linne	Puruko	
Cypraea tigris Linne	Mowang	
Cypraea erosa Linne	Buskay	
Cypraea annulus Linne	Buskay	
Cypraea mappa Linne	Ziper-ran	
C. testudinaria Linne	Burubaktin	
Monodonta labio Linne	Haragaday	
Cypraea talpa Linne	Mowang	
Cypraea felina Gmelin	Buskay	
Phalium glaucum Linne	Hali-hali	
Cymbiola vespertilio Linne	Layagan	
Tridacna gigas	Talaba	
Charonia tritonis tritonis Linne	Budyong	
Pinctada margaritifera Linne	Tipay	
Fragum unedo Linne	Takal	
Comptopallum radula	Pamaypay	

Table 5. Commercial Value of Mollusks in Biri, Northern Samar

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ACKNOWLEDGMENT

The researchers wish to thank the UEP and the College of Science Administration, and the University Research and Development Services for the support extended.