

**Preliminary Survey of Conidae; Fleming,
1822 Family of Ayoke Island,
North Eastern Mindanao, Philippines**

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Abstract

The Philippines is part of the Coral Triangle, which is thought to be a biodiversity hotspot for marine life, including Conus species. However, this region also has the highest data gaps, particularly in the north-eastern region of Mindanao. Ayoke Island lies at the edge of the Pacific Ocean in Cantilan, Surigao del Sur, North Eastern part of Mindanao, Philippines. Cone snails are distinctive marine animals with growing significance in biomedical research and study due to their conopeptides or conotoxins. This study aimed to account the species of Conidae; Fleming, 1822 Family in Ayoke Island. Purposive sampling was employed. Three sampling sites were established. The specimens, both live and fossilized, were collected from the sampling sites by hand-picking during low tide and gleaning, as well as from some locals' collections. Only those that belong to Conidae family were scored. A total of four hundred sixteen (416) cone shells comprising thirty one (31) species belonging to Conidae; Fleming, 1822 family were scored and accounted. Based from the relative abundance, two (2) species namely, *Conus frigidus* Reeve, 1848 and *Conus retifer* Menke, 1829 were uncommon in the sampling stations. The remaining twenty nine (29) species were all occasional.

Cone snails were prized by the Ayokenhon because of their high valued ecosystem services offered. The main issue with managing and protecting marine life and shells was still a lack of adherence to laws and regulations. Cone snails are essential to biomedicine, hence care should be used when handling and harvesting them.

Keywords: Cone Shell, Relative Abundance, Ecosystem Services, Biomedicine

Introduction

Due to their exceptional diversity, widespread distribution, high degree of endemism, varied depth distribution, and a well-established global market in their trade from amateur shell collectors to commercial traders, the cone snails of the genus *Conus* (Linnaeus, 1758) present an excellent opportunity to explore global threats to marine mollusks. Additionally, due to the presence of the venom apparatus they use to immobilize prey, cone snails are actively being sought out by international drug companies and researchers as a potential pharmacological resource. Cone snails are also occasionally consumed as food in some Pacific Island communities.

Cone shells can be found from the intertidal zone to a depth of more than 1000 m, and they can be found on a variety of sea bottom substrates, such as stony grounds, sand or mud plains, coral reefs, and seagrass beds. *Conidae* is a very popular family among gastropods due to its rarity and beautiful color. Many fishermen families among coastal villages are actively engaged in the collection of these shells and also in the shell handicraft industry. They are widely used for making dolls, fantasy flower sculptures of gods, etc. A sizable group of collectors have always been drawn to the eye-catching shell patterns. They are also significant economically because there are established markets for their shells all over the world thanks to commercial traders and shell collectors. Cone shells were among the most expensive natural history artifacts in the seventeenth century. Today, many *Conus* peptides are employed often as medicinal drugs and research tools in the brain field. Its venom is becoming more and more significant in neuroscience and medicine. Due to their evolution into one of the largest marine taxa, cone snails are crucial to biodiversity. They are also valuable to biopharmaceutics since they present unrivaled chances for the creation of innovative medicines. These exposed *Conus* to exploitation. Extinction will occur if overfished.

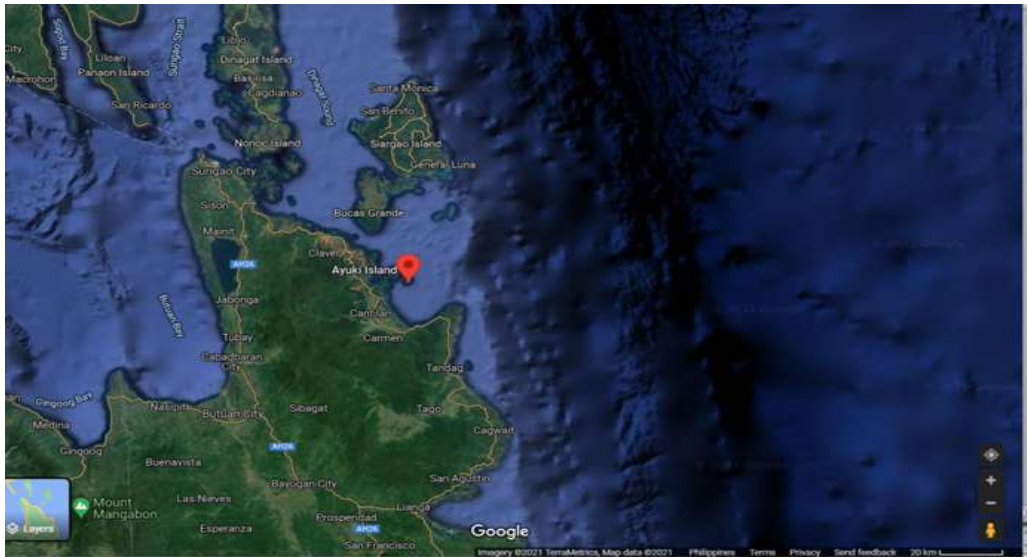
Hence, this paper would like to assess the *conus* species in Ayoke Island specifically, list the species of *conus* collected and determine its relative abundance of each species in the area.

Materials and Methods

The Study Site

The study was conducted on March to May 2020 at Ayoke Island, Cantilan, Surigao del Sur. Ayoke Island is one of the islands and islets along the coastlines in the town

of Cantilan, Surigao del Sur in North Eastern Mindanao. It belongs to the group of islands called Isla Heneral (General Island). It is located at right edge of the Pacific Ocean (Figure 1) Cantilan 9.394773, 126.057696



Source: Google Map

Figure 1. Location of the study site.

Sampling Design

Purposive sampling was employed. Three sampling stations were established. Specimens were obtained from gleaning and hand-picking inside the sample stations. Specimens were accounted. Only three to five samples for each specimen were brought to the laboratory for identification and preservation. Both dead and live specimens were brought to the Biology laboratory in North Eastern Mindanao State University for identification. Specimens were place in a container treated with 70% ethyl alcohol.

Collection and Identification of Samples

The samples were gleaned, hand-picked within the sampling stations and taken from the local residents' collection.. Each specimen was photographed on site upon collection using Nikon DSLR camera. Initial identification was done on site with the help of the gleaners in the site. Further identification was performed at the laboratory through their morphological characteristics using identification keys, monographs, compendiums, books, online and hard copy references and personal communication with the expert. The identified specimens were process and stored in a cabinet for future references.

To determine the relative abundance of each species, the scale shown in Table 1 which was adopted from Slimming & Jarrett (1970) and Jackson (1995) as indicated in (Agombar, Dugdale, & Hawkswell, 2003) was utilized.

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Scale	Relative abundance	Number of Specimens found during the period
1	Rare	1 to 4
2	Uncommon	5 to 8
3	Occasional	9 to 20
4	Fairly common	21 to 30
5	Common	31 to 99
6	Abundant	100 or more

Results

A total of 416 cone shells comprising thirty-one (31) species (Table 2) belonging to Conidae; Fleming, 1822 family were accounted. Of the total four hundred sixteen (416), one hundred forty-one (141) individual cones accounted in sampling site 1, 137 individuals in sampling site 2 and 138 in sampling site 3 (Figure 2). Based from the relative abundance, 2 species namely, *Conus frigidus* Reeve, 1848 and *Conus retifer* Menke, 1829 were uncommon in the sampling stations. The remaining 29 species were all occasional.

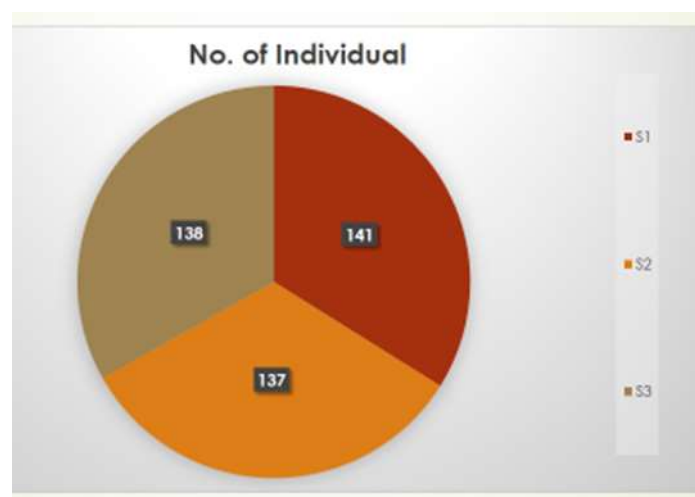


Figure 2. Number of individual Conus species accounted in 3 sampling sites.

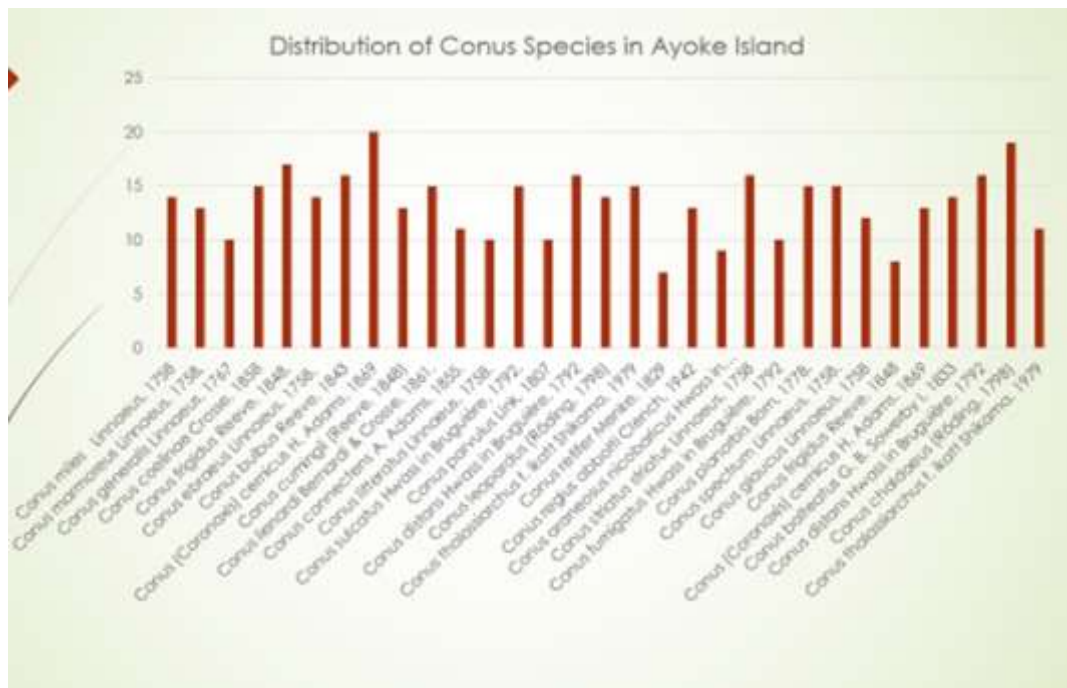


Figure 3. Distribution of sampled species of conus in Ayoke Island.

The figure above shows the distribution of the 31 species of cones in the 3 sampling sites in Ayoke Island. Among the species scored, *Conus (Coronaxis) cernicus* H. Adams, 1869 the most numbered collected and occasionally abundant.

Table 3. Preliminary species checklist and relative abundance of *Conus* species in Ayoke Island

No.	Species	S 1	S2	S3	Total Count	Relative abundance description
1	<i>Conus miles</i> Linnaeus, 1758	5	9	0	14	Occasional
2	<i>Conus marmoreus</i> Linnaeus, 1758.	8	4	1	13	Occasional
3	<i>Conus generalis</i> Linnaeus, 1767	2	6	2	10	Occasional
4	<i>Conus coelinae</i> Crosse, 1858	5	7	3	15	Occasional
5	<i>Conus frigidus</i> Reeve, 1848.	6	6	5	17	Occasional
6	<i>Conus ebraeus</i> Linnaeus, 1758.	4	4	6	14	Occasional
7	<i>Conus bulbosus</i> Reeve, 1843	7	1	8	16	Occasional
8	<i>Conus (Coronaxis) cernicus</i> H. Adams, 1869	8	3	9	20	Occasional
9	<i>Conus cumingii</i> (Reeve, 1848)	9	0	4	13	Occasional
10	<i>Conus lienardi</i> Bernardi & Crosse, 1861.	2	9	4	15	Occasional
11	<i>Conus connectens</i> A. Adams, 1855.	4	4	3	11	Occasional
12	<i>Conus litteratus</i> Linnaeus, 1758.	3	5	2	10	Occasional
13	<i>Conus sulcatus</i> Hwass in Bruguière, 1792.	6	7	2	15	Occasional

Table 3 (continued). Preliminary species checklist and relative abundance of Conus species in Ayoke Island

14	<i>Conus parvulus</i> Link, 1807	2	8	0	10	Occasional
15	<i>Conus distans</i> Hwass in Bruguière, 1792	1	9	6	16	Occasional
16	<i>Conus leopardus</i> (Röding, 1798)	0	6	8	14	Occasional
17	<i>Conus thalassiarachus</i> f. <i>ikatt</i> Shikama, 1979	3	3	9	15	Occasional
18	<i>Conus retifer</i> Menke, 1829	1	5	1	7	Occasional
19	<i>Conus regius abbotti</i> Clench, 1942	5	5	3	13	Occasional
20	<i>Conus araneosus nicobaricus</i> Hwass in Bruguière, 1792	6	1	2	9	Occasional
21	<i>Conus striatus striatus</i> Linnaeus, 1758	8	4	4	16	Occasional
22	<i>Conus fumigatus</i> Hwass in Bruguière, 1792	3	2	5	10	Occasional
23	<i>Conus planorbis</i> Born, 1778.	6	3	6	15	Occasional
24	<i>Conus spectrum</i> Linnaeus, 1758.	2	5	8	15	Occasional
25	<i>Conus glaucus</i> Linnaeus, 1758	3	7	2	12	Occasional
26	<i>Conus frigidus</i> Reeve, 1848	3	1	4	8	Uncommon
27	<i>Conus (Coronaxis) cernicus</i> H. Adams, 1869	8	0	5	13	Occasional
28	<i>Conus balteatus</i> G. B. Sowerby I, 1833	6	2	6	14	Occasional
29	<i>Conus distans</i> Hwass in Bruguière, 1792	7	4	5	16	Occasional
30	<i>Conus chaldaeus</i> (Röding, 1798)	6	5	8	19	Occasional
31	<i>Conus thalassiarachus</i> f. <i>ikatt</i> Shikama, 1979	2	2	7	11	Occasional
	TOTAL	141	137	138	416	

Conclusion

The present study initially listed 31 species of cone shells (Family Conidae) of Ayoke Island in Cantilan, Surigao del Sur, North Eastern Mindanao, Philippines. This initial record may increase with future researches, especially in deeper waters. Thus further study is recommended to enrich it. The diversity of Conus species observed suggests that it could be a good biodiversity indicator, thus awareness and conservation may be done. Strengthen the implementation of the existing laws on protection, preservation and conservation of the species of conus especially those with medical and economic importance.

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