



## RESEARCH PAPER

## OPEN ACCESS

## Assessment of *Conus* species (Gastropoda: Conidae) at selected shorelines of Sulu, Philippines

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### Abstract

The Philippines is considered to be part of the Coral Triangle, which is known as a biodiversity hotspot for marine life including *Conus* species, and at the same time holds the most data deficient especially in the Sulu archipelago. Cone snails are unique marine organisms that have rising importance in the field of biomedical research and studies known for its conopeptides or conotoxins. The present study assessed and identified *Conus* species found at selected shorelines of Sulu, Philippines. There were a total of 22 species recorded on the island. For the local people of Sulu, cone snails were not just valued for their exoskeleton and shell pattern but some sold them for their meat value. Often, market places have available *Conus* species that are sold. Some locals named Cone snails as “dulaw” and were said to be edible by just boiling the snails. But due to the commercial demand and overexploitation of marine life, *Conus* species were on the edge of depletion. Lack of implementation and obedience to the laws and regulations were still one of the problems in the conservation and management of marine life and shells. Cone snails, due to its biomedical significance, should be properly managed and harvested sustainably. The data deficiency of Cone snails in the Sulu archipelago proves that these important marine resources should be conserved and watched for future needs.

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## Introduction

The so-called “Coral Triangle” in the central Indo-Pacific region, which encompasses parts of Indonesia, Papua New Guinea, Malaysia and the Philippines were very known for the rich diversity and considered as hot spot for *Conus*, comprising more than 30 different species observed to co-occur on a single reef (Kohn, 2001; Kohn, 1997). Nowadays more than 85% of these marine reef areas are threatened by local stressors, which are substantially higher than the global average of 60% (Burke *et al.*, 2012).

In the Philippines mostly in the northern part of the archipelago much is already known in terms of the diversity and study of *Conus* (Vallejo, 2001; Cruz *et al.*, 2012). Yet with regards to the data availability of Cone snails in the southern part of the country especially in the province of Sulu which is at the center for both Sulu and the Celebes Sea, there is a scarcity of information.

*Conus* species or Cone snails are unique marine organisms that belong to the class Gastropoda (Dutertre and Lewis, 2011). According to Olivera 2006, it has over 700 extant species. It was evidently one of the largest genera and from an evolutionary perspective it was also among the most successful marine invertebrates. The characteristics and appearance of cone snails like their shape pattern, color, and shade continue to attract collectors and sell them for a high price depending on the rarity of the species (Rice, 2007). Cone snails are predatory gastropods and are uniquely known for its venom capacity in hunting their prey (Duda *et al.*, 2001).

The venom of a single species of cone snails which they are using for defense and hunting their prey is a mixed cocktail from a range of fifty to two hundred different peptides which are also known as “conopeptides”/“conotoxins”.

These peptides contains ten (10) to thirty-five (35) amino acids and is generally targeted or blocked at voltage-gated or ligand-gated ion channels that numb or paralyze their prey (Olivera and Terlau, 2004).

Prialt, for example a peptides extracted from *Conus magus*, already have drug proven clinical utility (Miljanich, 2004), but in general considering the vast diversity of *Conus* snails and its venom peptides, only few are studied and characterized so far.

Neuroscientist and other researcher are now studying these peptides looking for the leads on the treatment and understanding of pain. It is somehow important to be aware of the current condition with regards to our Cone snails and be able to properly conserve and utilized them properly.

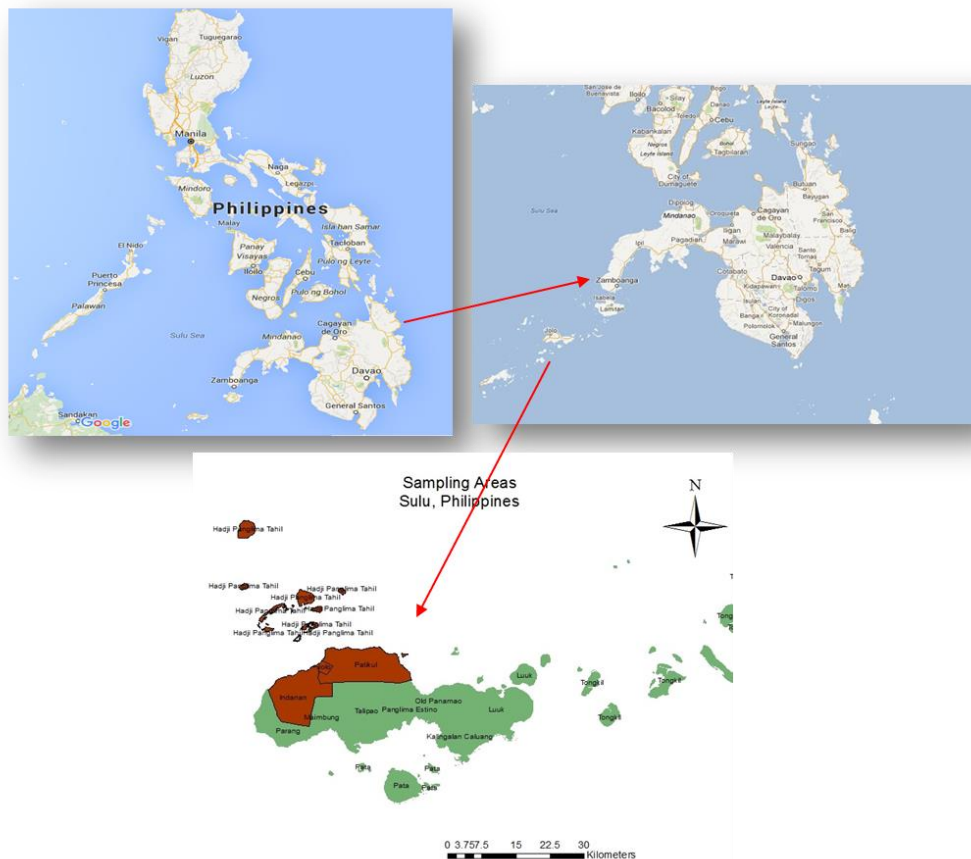
The study on the assessment of natural and fossilized *Conus* species in the Sulu, Philippines will help us understand and identify species of *Conus* and its current status in the area, as well as the means to have a conservation activity with regards to the genus *Conus* in the region.

In the study conducted by Muttenthaler *et al.*, 2012, overall genus *Conus* represents a good low-cost indicator for long-term studies of human impact and comparison of the status of similar, but geographically distant ecosystems. Thus, assessing the status of Cone snails in the area will also give us an overview of the human impacts on the area that threaten not just cone snails but also other marine life.

## Materials and methods

### Study Area

The study was conducted in the Province of Sulu, Bangsamoro Autonomous Region in Muslim Mindanao, Philippines. The estimated terrain elevation above sea level is 1 meter (Google Map). The study area comprises with a total of four (4) municipalities (Fig. 1), the coastal area of Jolo (6°03'13"N 121°00'01"E), Hadji Panglima Tahil (6°06'37"N 120°57'58"E), Patikul (6°05'19"N 121°06'25"E), and Indanan (5°58'20"N 120°58'10"E). Coastal area of Sulu are surrounded by different types of reefs, including coral reefs, reef shelves, patch reefs, seagrass and sandy bottom reef which are considered to be a habitat for *Conus* snails.



**Fig. 1.** Study area.

### *Sample Collection*

Collection and recording of samples were done during low tide along the shoreline. Sampling was done using a combination of both walking and snorkeling depending on the depth of the reef in the area. Both naturally living and fossilized *Conus* snails were recorded on the analysis and observation were done during day time.

Shell stores where there are available *Conus* snails were also identified and samples were collected. Personal interviews were conducted among fishermen and local residence present in the area with regards to their knowledge on *Conus* snails as well as its, conservation and utilization.

### *Identification*

The collected live samples were washed with bleach to remove the periostracum and were taken for identification together with the fossilized *Conus* shells. Scientific identification was done through the

assistance of a Personnel from the Marine Science Museum of MSU-Iligan Institute of Technology, College of Science and Mathematics, Department of Biological Sciences. Identification was also confirmed by Professor Alan Kohn of the University of Washington. Descriptions also were made along with identification.

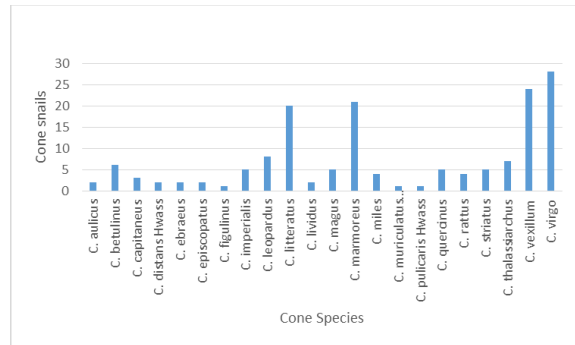
### **Results and discussion**

Samples were collected from the different shoreline in the province of Sulu, along with the shell collected from different shop shell collectors and market places. A total of 158 shells distributed into 22 different species of Cone snails were collected and identified on the study area (Fig. 2 and Fig. 3).

According to Wells 1989, Cone snails were categorized among the so-called Ornamental Shells. These shells are known for its decorative value, as a souvenir items and decorations. They are commonly exported in a form of a shell pack or unprocessed raw shells.



**Fig. 2.** *Conus* species identified in selected shoreline of Sulu, Philippines



**Fig. 3.** *Conus* species distribution

For the local people of Sulu cone snails were not just valued for their exoskeleton and shell pattern but some sold them for their meat value. Often times, market places have available *Conus* species that are sold. Some locals named Cone snails as “dulaw” and were said to be edible by just boiling the snails. In the viewpoint of the people there, only few have the knowledge on the venom capacity of the species. Some only think that whatever is in the shell can be eaten and considered to be not harmful. In the northern part of the Philippines, *Conus magus*, *C. radiatus* and *C. furvus* are cooked in coconut milk with garlic, onions, peppers, and ginger making a tasty creamy soup (Chadwick and Olivera, 2009).

Due to the commercial demand and overexploitation of marine life in the area and including *Conus* species, it resulted to scarcity of these snails along with the other commercial shells. Sulu has been already known for exporting shells with ornamental and decorative values to different region in the Philippines, specifically on its neighboring City like Zamboanga. According to (Peters *et al.*, 2013) among their 632 assessed *Conus* species, one in ten Cone snails were considered to be at risk or may in the future. Apparently there are already number of existing laws and regulations that prevent and regulate the collection and export of shells both national and international. Shell collectors and buyers were now limited on the shells they export and bought from local fishermen.

In Philippine administrative orders, issued by the Department of Agriculture - Bureau of Fisheries and

Aquatic Resources (DA-BFAR) prohibit the collection of shells as well as regulation on its gathering. This Administrative Order helps on the initiatives on the different region in the Archipelago including Tawi-Tawi, to manage their marine life in a form of a permit system of prohibition in exporting specific species and size limits available for collection. In Sulu however, some still manage to sell and collect and even export shells. Lack of implementation and obedience of the laws and regulations were still one of the problem on the conservation and management

The locals must be aware of the ecological together with the economic impacts of the removal and overexploitation of such species. Cone snails and other marine life should be properly managed to protect and conserve our natural marine resources and also to prevent ecological imbalance and possible depletion of these assets. Cone snails, due to its biomedical significance should be properly manage and harvested sustainably. The data deficiency of Cone snails in Sulu archipelago proves that these important marine resources should be conserved and watched.

### Conclusion

In the study conducted on the assessment of natural and fossilized *Conus* species on selected shorelines of Sulu, Philippines a total of 22 species of Cone snails were collected and identified. For the locals in Sulu, *Conus* species were not just valued for their exoskeleton and shell pattern but some sold them for their meat value. Often, market places have available *Conus* species that are sold and were said to be edible by just boiling the snails. Cone snails, due to its biomedical significance should be properly managed and harvested sustainably. The data deficiency of Cone snails in Sulu archipelago proves that these important marine resources should be conserved and watched.

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