Species Composition of Coral Reef Fishesin Nonoc Island, Philippines

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Abstract: This study aimed to determine the species composition of reef fishes in Nonoc Island, Surigao City, Philippines. The multiple fishing techniques were conducted in the established 50x50 m quadrats in the three sampling stations of the area in January 2020. It yielded 16 species of reef fish fauna from 12 families. All species are native in the Philippines and the majority are of Least Concern Status (94%). *Chlorurus sordidus*has the highest relative abundance (12%) among the collected species. Station 1 or Brgy. Nonoc has the highest number of taxa (S=16) and the most diverse (H'=2.65) among the three sampling stations. The Nonoc Island still hosts a noteworthy number of reef fish fauna despite the mining activities that last for decades and the inadmissible fishing activities by the populace in the area. Hence, regular monitoring and intensive study are essential to come up with a comprehensive data of reef fish fauna in the area.

Keywords: Least concern, native species, perciformes

Introduction

The entire seas of the Philippines belong to the coral triangle which covers 75% of all coral species, 35% of the world's coral reefs, at least 3, 000 fish species making it as the global center of marine biodiversity (Wilkinson, 2008; Veron *et* al., 2009). Coral reefs provide mankind with many economically important products and natural services. In the Philippines, the most important coral reef products are fishes and other marine animal species serving as food.

Fishes are considered to be an important element in the economy of the Philippines and other nations and played an important role inthe human's diet and the ecosystem (Tessema &Mohamed, 2016). However, as the human population exponentially increased, these organisms have been overexploited for consumption and its habitat has been destroyed due to inadmissible fishing practices. Past studies on the specific effects of the destructive fishing practices customarily focused on the directimpacts either on the physical structure of the habitat or on the target organisms.

Nonoc Island is situated in the North-eastern tip of Mindanao, the Philippines where the coral reef is considered to be abundant. However, the island was part of the Surigao Mineral Reservation (SMR) which had been identified as early as 1912. Mining activities and illegal fishing in Nonoc Island and Surigao sea's corals had been in converses way back decades ago. These activitiesmay have negative impacts on the coral reefs and on contrary on the different marine organisms inhabiting therein, including the fishes.

Published studies concerning the coral reef fishes in the island are very scarce. Hence, it has prompted the researchers to conduct this endeavor. This study aims to provide an inventory of reef fishes in Nonoc Island, Philippines.

Materials and Methods

Study Area and Establishment of Sampling Stations

Nonoc is an island in Surigao city with a total land area of 245.34 km^2which consists of three barangays namelyNonoc, Cantiasay, and Talisay. According to the 2015 Census, the barangay Nonoc has a population of 1,310, while, Cantiasay and Talisay have only 984 and 1403 total population, respectively.

Three sampling stations were identified in the area (Fig. 1). These comprised the three barangays of the island namely: Station 1 (Barangay Nonoc), lies geographically at 9° 47'N and 125° 29'E; Station 2 (Barangay Cantiasay), lies geographically at9°85'N and 125°58'E;and Station 3 (Barangay Talisay), lies geographically at 9.82° N and 125.62° E.

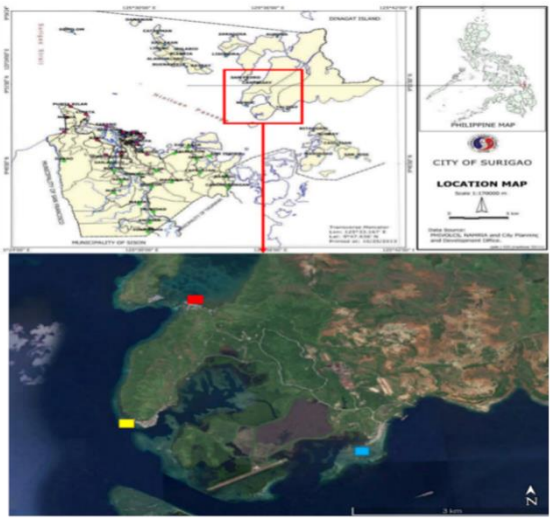

Figure 1. Map showing the location of Mindanao Island in the Philippines and the three sampling stations in Nonoc Island. Station 1(Yellow); Station 2 (Red); Station 3 (Blue)

Fish Inventory and Identification

A 50x50 m quadrat was established in the coastal areas with a distance of 150 m from the shoreline in every station. Fish samples were collected using multiple fishing techniques using typical fishing gears such as spear gun and seine net measuring 15m long. Fish sampling was done on the whole month of January 2020.

Species were identified up to the lowest possible taxon using the references,namely, Allen *et al.* (2003) and Gonzales(2013), and online data sources such as fishbase.org. The conservation and distribution statuses were determined from the IUCN Redlist ofThreatened Species website (https://www.iucnredlist.org/).

Data Analysis

Biodiversity Indices such as Evenness, Species Richness index (S), Shannon-Wiener index (H'), and Simpson's Dominance index(D)were computed using PAST.

Result and Discussions

A total of 249 individuals belonging to 16 species from 12 families were recorded in Nonoc Island during the conduct of the study (Table 1). Station 1 had the highest number of individuals (N=105), followed by station 3 (N=93), and station 2 with the lowest number of recorded individuals (N=51). The high number of individuals in station 1 when compared to other stations might be due to its location which is an open sea and far from any anthropogenic activities, that can be suitable for the existence of many marine organisms specifically, fish species.

Most of the species are from order Perciformes (56%) followed by Scorpaeniformes (19%), and Tetraodoniformes (13%) (Fig. 2). All species are native to the country (100%) and majority have Least Concern (94%) status (Fig. 3). This indicates that no threatened or endangered species of marine fishes are collected in the area during the conduct of the study.

Table 1. The recorded reef fish species in Nonoc Island, Philppines.

Order	Family	Name of Species	Station 1	Station 2	Station 3	Total
Anguilliformes	Muraenidae	*Gymnothorax javanicu* [N, LC]	5	0	3	8
Labriformes	Scaridae	*Chlorurus sordidus* [N, LC]	12	8	10	30
Perciformes	Acanthuridae	*Naso lituratus* [N, LC]	5	6	9	20
	Caesionidae	*Caesio cuning* [N, LC]	10	7	5	22
	Lutjanidae	*Lutjanus corponotatus* [N, LC]	3	3	5	11
		Lutjanus sebae [N, LC]	10	6	4	20
	Serranidae	*Cephalopholis argus* [N, LC]	6	2	7	15
		Epinephelus malabaricus [N, LC]	3	0	6	9
	Siganidae	*Siganus guttatus* [N, LC]	4	1	8	13
		Siganus virgatus [N, LC]	9	3	12	24
	Zanclidae	*Zanclus cornutus* [N, LC]	11	7	6	24
Scorpaeniformes	Platycephalidae	*Cymbacephalus beauforti* [N, LC]	1	1	3	5
		Platycephalus fuscus [N, NE]	7	4	0	11
	Synanceiidae	*Synanceia verrucosa* [N, LC]	6	1	11	18
Tetraodontiformes	Balistidae	*Canthidermis maculate* [N, LC]	5	0	3	8
	Monacanthidae	*Aluterus scriptus* [N, LC]	8	2	1	11
		TOTAL	105	51	93	249

N – Native; LC – Least Concern; NE – Not Evaluated

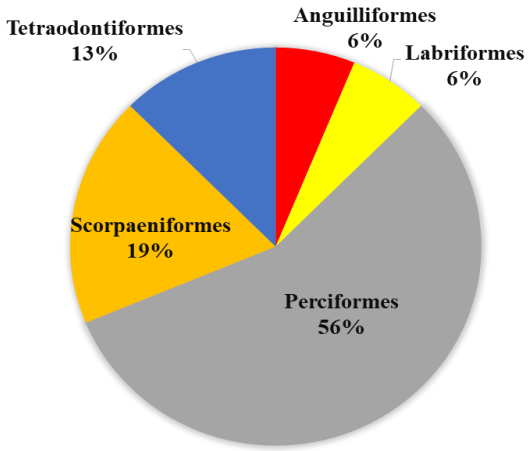

Figure 2. Order composition of reef fish fauna in the area.

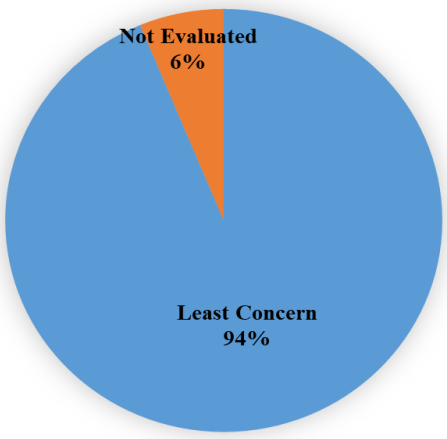

Figure 3. Percent Conservation Status of reef fish fauna in the area.

Among the collected species, *Chlorurussordidus* has a higher relative abundance value of 12%, while *Canthidermis maculate* has the lowest relative species abundance value of 3% (Fig. 4). This indicates that *Chlorurussordidus* is a common species relative to other species in the three sampling stations. This species is reportedly one of the most abundant and widespread scarid species in the Indo-pacific and it occupies a variety of habitat types although prefers the shallow slopes of coral reefs(Randall *et al*., 1998).

Among the three sampling stations, station 1 has the highest Taxa richness (S=16), the highest diversity index (H'=2.653), and the highest Evenness index (e^H/S=0.8876) (Table 2). The Shannon index increases as both the richness and the evenness of the community increase. The Evenness index of the three sampling stations almost approaches to 1, implying for even distribution of reef fish fauna in the area. According to Kumar *et al.* (2014), evenness value closer to 1 indicates that each species consists of the same number of individuals, however, if the value is close to zero, it indicates that most of the individual belongs to one or a few species.

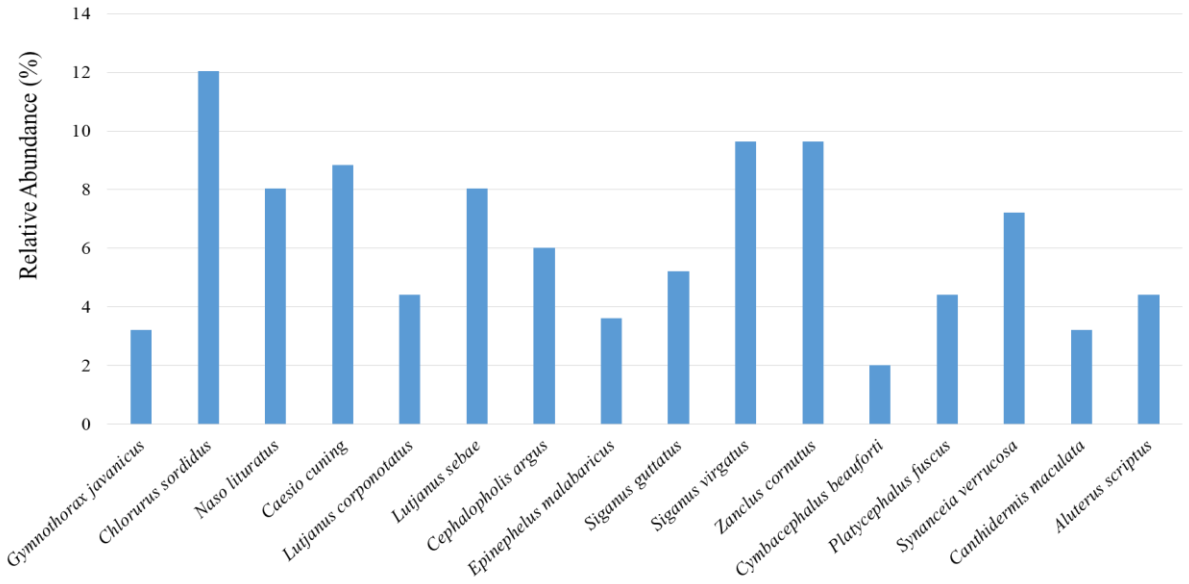

Figure 4. Relative abundance of reef fish fauna in Nonoc Island, Philippines.

Table 2. Biodiversity indices of the three sampling stations.

Indices	Station 1	Station 2	Station 3
Taxa (S)	16	13	15
Dominance (D)	0.07628	0.1073	0.08382
Shannon (H')	2.653	2.358	2.573
Evenness (e^H/S)	0.8876	0.8127	0.8733

Conclusion and Recommendations

Based on the findings of the study, the following conclusions were drawn: there were 16 species found in the study area. Species richness at three stations is high to which station 1 has the highest species richness value as compared to the other stations as it is in concordance with the diversity index H'=2.653. *Chlorurus sordidus* was found to account for the highest relative species abundance (12%). No threatened or endangered species were accounted in the study area.

Based on the conclusions, the following recommendations are offered: Conduct a further investigation with more days of data gathering and its specific measure. Encourage the Local Government of Nonoc Island to have orientation on marine life specifically for fish species, their primary function to the ecosystem as a whole for sustainability. The said orientation can help provide awareness not only for the barangay officials but to the community as well in terms of following the DENR standards for sustainable fishing and care of aquatic life in the area.

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