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Research Paper

On species-shift issue: dominance of non-commercially important epifauna in the coastal areas of Lanao del Norte, Philippines

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Abstract

Overgleaning of commercially-important seashells could alter balance of the epifaunal communities within a coastal area. This results to dominance of certain species, which may not be economically and ecologically favorable. Hence, a study was conducted to assess if dominance of non-commercially important epifaunal species happened in the coastal areas of Lanao del Norte as a consequence of overgleaning. Line transect-quadrat method was used to account the epifauna species seen. Results revealed a total of 3665 and 906 individuals belonging to 65 and 47 species, respectively, which are distributed into seven taxa, namely, Gastropoda, Holothuroidea, Bivalvia, Ophuiroidea, Malacostraca, Echinoidea and Demospongea. Theseepifauna species inhabiting the mangrove and tidal flat areas were generally of no commercial values. This is a glaring effect of overgleaning activities that alter the emergence of commercially-important epifauna. This would not only adversely affect their economic values but the ecological services they previously played as well. It is imperative therefore, that the local governments and the residents must revisit the implementation of regulatory mechanisms to protect the commercially-important epifauna and their habitat from overexploitation. This is to ensure the economic and ecological sustainability of epifauna species for the present and future generations.

Keywords: epifauna, species dominance, diversity, Lanao del Norte.

Introduction

Epifaunal species generally belong to the whole macroinvertebrateanimal groups. They are species without backbones and can be seen through a naked eye measuring to more than 1mm. Most of these species are important to humans ecologically and economically, thereby providing essential ecosystem services and income from tourism, commercial and recreational fisheries [1]. They are integral parts of marine ecosystems and played important roles to support the ecological function and stability of complex marine food webs.

The occurrence and distribution of macroinvertebrates, including the epifauna, are governed mostly by the physical and chemical quality of water and immediate substrate characteristics. Temperature, dissolved oxygen, pH and nutrients have considerable effects to the life of organisms [2]. The distribution of macroinvertebrates is determined by a number of factors such as the physical nature of substratum, depth, and nutritive content, degree of stability and oxygen content of the water body. The survival and stability of epifauna organisms are continuously threatened by changes in their habitat, which are associated with pollution, erosion and siltation [3]. The structural complexity of a habitat has often been invoked as an important factor influencing the diversity of associated communities[4]. More complex habitat providesa wider range of niches, and therefore, harbour a higher number of species that can potentially occupy within a given area [5].

The availability of habitat and food sources had contributed to a diverse epifauna communities with emphasis to the economically-important species. This is true in Lanao del Norte areas, and these results to provision of commercially important seashells, that are not only consumed locally but are sold to adjacent municipalities and provinces. The economic boom and its consumption in many areas had resulted into overexploitation, and therefore, their subsequent decline in composition and abundance. This is because the anthropogenic disturbances to natural ecosystems often result into simplification of the ecosystem leading to loss of biodiversity. These consequences of ecosystem functioning are often unrecorded due to lack of baseline studies and monitoring of natural ecosystems[6].

It is in this regard that this study was conducted as an additional information, particularly on the composition and abundance of epifaunal communities inhabiting the coastal areas of Kauswagan and Bacolod, Lanao del Norte. This is to account if there was a dominance of certain species that might be accounted for as a consequence of overgleaning activities. The information generated could still be part of the overall monitoring purposes for future management, conservation and environmental plans of the local governments, residents and other stakeholders.

Materials and Methods

The study was conducted in the coastal areas of Kauswagan and Bacolod, Lanao del Norte (Figure 1). Two replicated habitats were chosen: a mangrove area and a tidal flat area. Two sessions of field specimen collections were conducted, particularly on the months of June and August 2014. Specimen collections were done at daytime during low tides.

A line transect-quadrat method[7]was used to survey the epifaunal organisms in the habitats considered. Three 100m transect lines were established perpendicular to the shoreline. Each transect line had an interval space of 30m. Ten 1x1m^2 quadrat frames were placed in each transect line. All epifauna found within the quadrats were counted, identified from genus to species level as possible and recorded in a slate. Overturning of rocks was applied if applicable. Identification of all surveyed epifauna was based on available taxonomic books[8], internet sources and with the help of some experts. Presence of vegetation and substrate type were documented as well. Analysis of variance was used to compare epifauna species per habitat type for the two coastal areas.

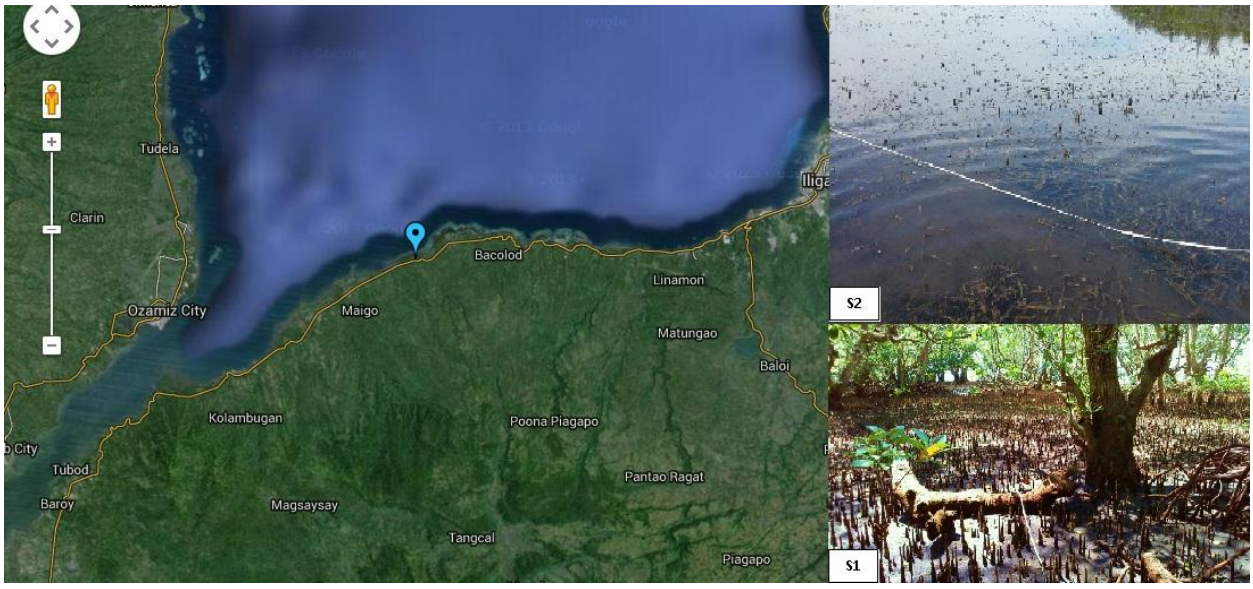

Figure 1: The study area and sampling stations in the mangrove (S1) and tidal flat (S2) of Bacolod and Kauswagan, Lanao del Norte, Philippines on June and August 2014

Results and Discussion

A total of 3665 individuals belonging to 65 species of epifauna were recorded in the mangrove and tidal flat habitats of Bacolod, Lanao del Norte distributed into seven taxa, namely Gastropoda, Holothuroidea, Bivalvia, Ophuiroidea, Malacostraca, Echinoidea and Demospongea. Whereas, in the habitats of Kauswagan, Lanao del Norte, there were a total of 906 individuals belonging to 47 epifaunal species in seven taxa, namely, Gastropoda, Holothuroidea, Bivalvia, Ophuiroidea, Malacostraca, Echinoidea and Demospongea (Table 1).

In this study, the gastropod species were the dominantgroups within the tidal flat and mangrove areas in both municipalities. However, these gastropod species were not harvested for food as they are mostly not edible. The commercially-important and edible gastropods were harvested thoroughly that during sampling sessions, they were minimally recorded. This means that overgleaning happened, that in turn, created a dominance of non-edible epifauna. Other dominant species were the brittle stars and some sea anemones, which still, are not edible nor commercially important. As a result, gleaners shifted from collecting edible gastropods to other species of choice like edible sea cucumbers and echinoderms.

Table 1: The epifauna organisms distributed in the mangrove and tidal flat coastal areas of Kauswagan and Bacolod, Lanao del Norte on June and August 2014

Species	Family	Common name	Local name	Kauswagan	Bacolod
Abra alba				1	0
Acanthia monodon				1	0
Aesopus japonicus	Columbellidae			0	8
Amphiura sp.				7	0
Anachis misera misera	Cstellariidae			0	6
Anadara antiquata	Arcidae			0	4
Archaster typicus				8	0
Babylonia formusa	Babyloniidae			0	2
Babylonia lutosa	Babyloniidae	Lutose Babylon		0	7
Bullia mauritiana	Nassariidae			0	18
Canarium labiatum				3	0
Canarium urceus				2	0
Cancellaria sp.	Cancellariidae			0	40
Cerithidea sp.				1	0
Cerithium atratum	Cerithiidae	Horn shell	*tapok tapok*	0	9
Cerithium nesioticum	Cerithiidae	Horn shell	*tapok tapok*	0	10
Cerithium rostratum	Cerithiidae	Horn shell	*tapok tapok*	0	5
Cerithium sp.				3	0
Cominella glandiformis	Buccinidae			0	14
Conus coronatus	Conidae			0	5
Conus mutabilis	Conidae			0	8
Culcita sp.				2	0
Cymatium sp.	Ranellidae			0	3
Cypraea annulus	Cypraeidae	Cowries	*Bulalo*	47	16
Cypraea moneta				3	0
Dosinia anus	Veneridae			0	6
Euplica scripta	Columbellidae			0	4
Haminoea natalensis	Haminoeidae			0	30

Hermit crab				0	7
Holothuria fuscopunctata	Holothuriidae	Elephant trunkfish		0	29
Holothuria inhabilis	Holothuriidae		*Balat pisot*	0	14
Holothuria leucospilota	Holothuriidae	Sky Black sea cucumber		0	19
Linckia laevigata				3	0
Liotina peronii	Liotiidae			0	11
Littorina littorea				10	0
Mammilla melanostoma	Naticidae			0	8
Margarites pupillus	Margaritidae			0	49
Morum cancellatum				2	0
Nassarius crematus	Nassariidae	Dog whelks	*Daro daro*	0	13
Nassarius globosus	Nassariidae	Dog whelks	*Daro daro*	0	12
Natica stellata	Naticidae	Moon shell	*Bulanbulan*	0	4
Nerita sp.				16	0
Neritina communis	Neritidae	Polished Nerite	*sihi*	0	2
Ophiactis savignyi				25	0
Ophiarachna incrassanta				7	0
Ophiocoma echinata				11	0
Ophionereis porrecta	Ophionereididae			30	182
Ophionereis sp.	Ophionereididae			0	3
Ophiothrix fragilis				7	0
Orania livida	Muricidae			0	9
Pitar sp.				1	0
Pleurobranchaea sp.	Pleurobranchaeidae	Slug	*Alikahok*	0	37
Proteaster nodusus				9	0
Pyren scripta	Columbellidae			121	15
Pyrene testudinaria				32	0
sea urchin				0	5
Solenosteira sp.	Buccinidae			0	5
Spondylus sp.				1	0
Sponge				12	12
Stichopus hermanni	Stichopodidae			0	15
Strombus sp.				3	0
Strombus sp.	Strombidae	Strombs	*aninikad*	0	10
Strombus urceus	Strombidae	Strombs	*aninikad*	0	11
Synapta sp.				1	0
Synapta maculata	Holothuriidae			0	13
Tectarius coronatus				26	0
Terebralia palustris	Potamididae			0	6
Theodoxus sp. 1				0	393
Tripneustes sp.				1	0
*Charybdis orientalis*crab				2	0
Unidentified sp. #1				3	0
Unidentified sp.#2				1	0

The habitat and food sources are enough to support the epifaunal population. This is attributed to abundant vegetation, mainly dominated by seagrasses, *Enhalus acoroides* and *Thalassia hemprichii*. Epiphytic algae were also present in seagrass blades that served as their food source as well. Mangroves were also present like *Sonneratia alba* and *Rhizophora mucronata*. Substrate type was generally muddy-sandy substrate, which is the common substratum for these habitats and also a favourable habitat for these epifauna organisms. The shelter and food for many intertidal epifauna were provided, as well as protection from strong wave action and from any environmental stressor in the community [9][10]. These observations suggest that, the community structure of epifauna in many habitats has strong influence on the diversity of species [11]. Species variability in a community is often associated with habitat complexity [12]. A uniform substratum type tends to support similar types of organisms, while heterogeneous substrata provide many habitats for gastropods with different substrate preferences. This conformed to the present study that epifauna species in the tidal flat area were more concentrated in sandy type of substratum associated with seagrasses. For instance, some species were attached to leaves of seagrasses while others were found on the substrate. In mangrove area, species were more concentrated on sandy-muddy type of substratum and were mostly found in the stem, rocks, and root system of mangroves.

The abundance and dominance of inedible epifauna might be attributed to overharvesting by the gleaners that eventually disturbed and altered the balance of population structure and the habitat and food sources. Unregulated and over harvesting of those epifauna could be due to the increasing demand of consumption and market. These anthropogenic disturbances, specifically on overgleaning, had resulted into simplification of the ecosystem and diversity loss[6], particularly for the edible epifauna.

The epifauna groups were compared if significant variations could be observed for both habitat types and coastal areas. Results showed that there was a significant difference observed ($P < 0.05$) among the epifauna groups between habitat types. Therefore, each habitat harbors unique epifaunal species that would only thrive and find refuge in it. However, destroying one habitat might pose some adverse impacts to other habitats like death of epifauna species or their transfer from one habitat to another that in turn might disturb the usual predator-prey relationships. No significant differences for the epifauna organisms between the two municipalities, and therefore, the two coastal areas suffered similar conditions and consequences.

Conclusion and Recommendations

There was a total of 3665 and 906 individuals belonging to 65 and 47 species, respectively, which were distributed into seven taxa namely, Gastropoda, Holothuroidea, Bivalvia, Ophiuroidea, Echinoidea, Malacostraca and Demospongiae recorded in the mangrove and tidal flat areas of Bacolod and Kauswagan, Lanao del Norte. Generally, there was a dominance of inedible gastropod species. Other epifauna recorded were of no commercial values as well. As such, this might be a glaring effect of unregulated and overgleaning activities.

This study conducted could help the local government units, residents and other stakeholders to revisit the implementation of relevant resolutions and ordinances formulated and enacted. This is to regulate overgleaning activities that not only destroy the epifauna organisms but their food and habitat sources as well. It is highly recommended that the collection of edible and commercially important gastropods should be regulated, such that there should be few days in a month left for no collection, particularly, gleaning is not allowed three days before and after the full moon to allow their spawning to be successful and undisturbed. The practice of overturning of rocks and intense trampling of substrates should be regulated to consider the need for habitat and feeding and breeding grounds of these epifaunal organisms. Lastly, educational campaign should be intensified to inform and educate the residents on proper management of their resources.

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