



RESEARCH PAPER

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Scleractinian corals in EDGE and IUCN Red list of Threatened species in selected areas of Camotes Sea, Central Philippines

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Key words: NIPAS, Hard corals, Endangered species, Photo-transect method, Colony shots

<http://dx.doi.org/10.12692/ijb/18.4.159-163>

Article published on April 29, 2021

Abstract

In Anthropocene era, coral species are among the most threatened marine fauna. Specific scleractinians coral species had been added for the first time in the IUCN Red List of Threatened Species in 2007. Cuatro Islas in Leyte had been monitored since 1994 while San Francisco Island in Camotes Islands, Cebu was surveyed in February 2019. Both group of islands are under the National Integrated Protected Areas Systems (NIPAS). Additionally, the coral reef areas in Palompon, Leyte were surveyed recently. The data of corals listed in International Union for the Conservation of Nature (IUCN) and Evolutionary Distinct and Globally Endangered (EDGE) hard corals were extracted from data through time using different survey methodologies with the latest reassessment adopting the NACRE-SHINE modified photo-transect method from May 2018 to September 2020. The surveys were conducted in randomly identified coral reef areas per sampling site. Photos from both transect and purposive samplings for colony shots were examined. *Fimbriaphyllia ancora*, *Heliofungia actiniformis*, *Lobophyllia serratus*, *Moseleya latistellata*, *Pachyseris rugosa*, *Physogyra lichtensteini*, *Turbinaria heronensis*, *T. mesenterina*, *T. peltata* and *T. stellulata* were documented. The presence of these IUCN Red List and EDGE coral species is a factor for consideration in the maximum and sustained protection of these critical coral reefs in concomitant with the implementation of E-NIPAS law and the expanded Philippine Fisheries Code.

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Introduction

Scleractinian corals are recognized to play a key role in shaping the Earth's history and key processes that supports survival of many organisms, including humans, for over 240-million years (Hughes *et al.*, 2017; Mouillot *et al.*, 2016). Unfortunately, most of reef-building corals are currently facing with threats of global extinction due to numerous human and environmental stressors (Crabbe, 2016; Huang, 2012; Polidoro *et al.*, 2011; Carpenter *et al.*, 2008).

Extinction can negatively affect evolutionary diversity leading to the loss of evolutionary pattern (Huang & Roy, 2013). Greater loss of genetic information especially those hard corals diverged from their family tree evolving as evolutionary distinct (Curnick *et al.*, 2015).

The Zoological Society of London launched the Evolutionary Distinct and Globally Endangered (EDGE) program to prioritize the conservation of EDGE species to prevent the loss of EDGE populations in areas they existed (Crabbe, 2015; Redding & Mooers, 2006). The EDGE species are in great threat of extinction supported with the data coming from the International Union for the Conservation of Nature (IUCN) Red List (Fukami, 2015; Huang, 2012) Particularly, most of the EDGE species were less studied or no research have been done before, resulting to scarcity of resources for science and conservation plans (Crabbe, 2016).

Conservation plans on the management of marine resources must be designed in consonance with the existence of EDGE species to battle the risk of extinction of these threatened species. Thus, it is imperative to identify, document and report the presence of local EDGE reef-building coral species to include as conservation priority.

Materials and methods

Sampling Site

The study was conducted in the coastal areas of Cuatro Islas Protected Landscape and Seascape (CIPLS), coastal waters of Palompon, Leyte and San Francisco, Cebu (see Fig. 1). Both CIPLS and San Francisco, Cebu

were declared as protected areas by virtue of the RA 7586 (NIPAS Law) and RA 11038 (e-NIPAS).

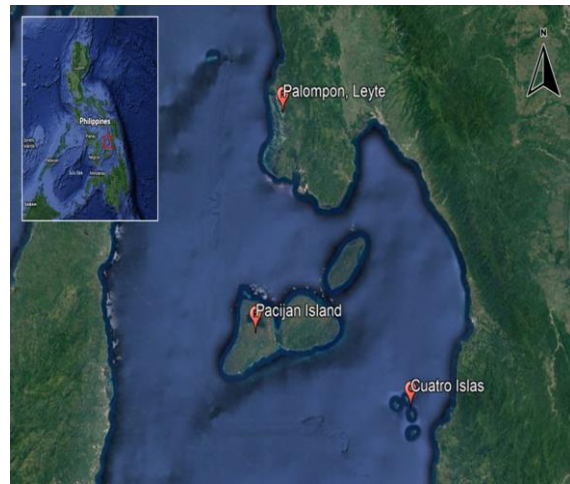


Fig. 1. Map showing the location of the sampling sites (Source map: Google Earth Pro, 2020).

Data Collection

In each sampling site, coral reef stations were randomly identified. Each station was delineated with a 75m x 25m sampling area where five transect lines were randomly laid in the upper reef slope of the coral reef.

Transect photographs along each transect lines (Licuanan *et al.*, 2017; 2019) and colony shots of hard corals were captured inside the defined sampling area.

Hard Coral Identification

Photos from both transect and colony shots were examined for identification. Corals of the World Vol. I-III (Veron, 2000) books were used as references for identification and confirmation of species.

Results and discussion

A total of 10 threatened hard coral species were recorded in the sampling areas: *Fimbriaphyllia ancora* (Veron & Pichon), *Heliofungia actiniformis* (Quoy & Gaimard), *Lobophyllia serratus* (Veron), *Moseleya latistellata* (Quelch), *Pachyseris rugosa* (Lamarck), *Physogyra lichtensteini* (Milne Edwards & Haime), *Turbinaria heronensis* (Wells), *T. mesenterina* (Lamarck), *T. peltata* (Esper), and *T. stellulata* (Lamarck) (Table 1).

Table 1. Identification of threatened hard coral species and their presence in the sampling areas.

Species	Cuatro Islas	San Francisco, Cebu	Palompon, Leyte
<i>Fimbriaphyllia ancora</i>	✓	✓	✓
<i>Heliofungia actiniformis</i>	✓	✓	✓
<i>Lobophyllia serratus</i>	✓	✓	✓
<i>Moseleya latistellata</i>	x	x	✓
<i>Pachyseris rugosa</i>	✓	✓	✓
<i>Physogyra lichtensteini</i>	✓	✓	✓
<i>Turbinaria heronensis</i>	x	✓	✓
<i>T. mesenterina</i>	✓	✓	✓
<i>T. peltata</i>	x	✓	✓
<i>T. stellulata</i>	✓	✓	✓

Legend: ✓ = present; x = absent

F. ancora (Fig. 2A), *H. actiniformis* (Fig. 2B), *L. serratus* (Fig. 2C), *P. rugosa* (Fig. 2D), *P. lichtensteini* (Fig. 2E), *T. mesenterina* (Fig. 2F) and *T. stellulata* (Fig. 3A) were sighted in all sampling areas. In addition, *T. heronensis* (Fig. 3B) and *T. peltata* (Fig. 3C) were not found in Cuatro Islas but recorded in the two other sampling areas. However, *M. latistellata* (Fig. 3D) was only found in Palompon, Leyte.

All of these EDGE hard corals recorded in all the sampling sites can only be found in the Indo-Pacific region. In fact, *M. latistellata*, *L. serratus*, *T. heroensis* and *T. stellulata* are rare in nature. However, *F. ancora*, *H. actiniformis*, *P. rugosa*, *P. lichtensteini*, *T. mesenterina* and *T. peltata* are common and widely-distributed in the Philippine waters (Veron, 2000).

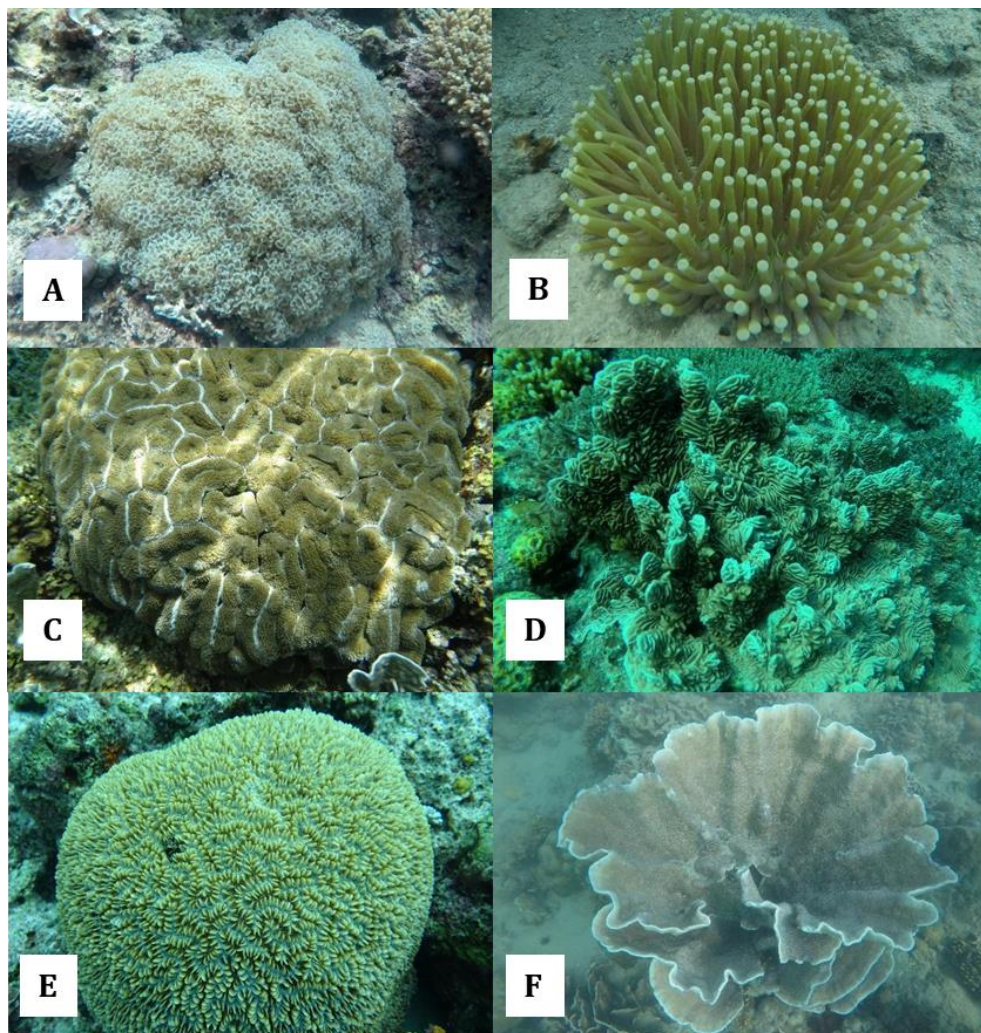


Fig. 2. Colony shots of the EDGE Hard Coral Species: *F. ancora* (A); *H. actiniformis* (B); *L. serratus* (C); *P. rugosa* (D); *P. lichtensteini* (E); and *T. mesenterina* (F).

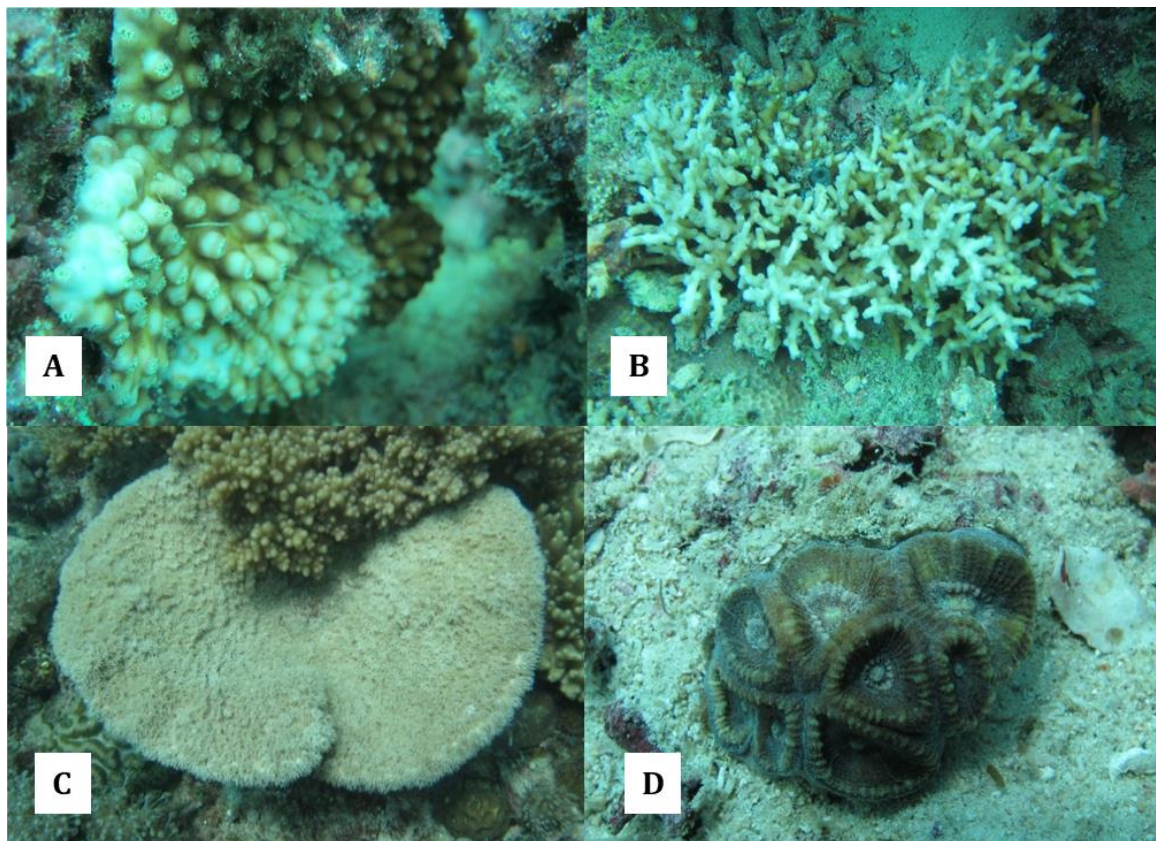


Fig. 3. Colony shots of the EDGE Hard Coral Species: *T. stellulata* (A); *T. heroensis* (B); *T. peltata* (C) and *M. latistellata* (D).

The presence of these EDGE hard coral species can be used as basis in the creation and amendment of existing conservation policies as part of conservation plans of stakeholders (Crabbe, 2016), mainly, in local areas which they existed before they lead to extinction which could significantly impact biodiversity in the marine environment. Reporting the presence of endangered hard corals has been influential in the abandonment in the construction of underwater parks in Palawan, Philippines which has been considered as the last ecological frontier.

The important key processes in the ecosystem could be left in peril affecting all of us (Hughes *et al.*, 2017). Inasmuch, two of the sampling areas were under the National Integrated Protected Area Systems (NIPAS) enacted through RA 7586 (NIPAS Law) and RA 11038 (e-NIPAS) which promotes conservation of biodiversity for sustainable development. Thus, stakeholders must unify to come up appropriate management strategies integrating the presence of these threatened hard coral species.

Conclusions

The data reveals the presence of ten evolutionary distinct and globally endangered hard coral species in the coral reef areas of Cuatro Islas Protected Landscape and Seascape, San Francisco, Camotes Islands, Cebu and Palompon, Leyte which could be adopted and utilized as basis for strict implementation of laws to protect them as well as reef-associated organisms from further degradation and worse, extinction.

Acknowledgement

This is a marine science contribution by the Institute of Tropical Ecology and Environmental Management – Aquatic Ecosystems Division (ITEEM-AED) and the Department of Biological Sciences of the Visayas State University funded by the Philippine Commission on Higher Education (CHED) DARE TO K-12 Transition Program and the Research Services Office of the Palompon Institute of Technology. This is in close collaboration with the Community Environment and Natural Resources Office (CENRO) of the Cuatro Islas

and Camotes Islands Protected Landscapes and Seascapes, the residents of San Francisco, Cebu and the Local Government Unit of Palompon, Leyte. Logistics support of the barangay Local Government Unit is acknowledged.

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