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Short Communication

Halimeda: An Indicator of the Relationship between HarbourConstruction and the Natural Restoration of the Environment - A Case Study of Shidao, Xisha Islands

Xu Hong Xu[1]*and Ma Xiao Ma[2]

[1]First Institute of Oceanography,China

[2]Institute of Marine Geology, Ministry of Land and Resources, China

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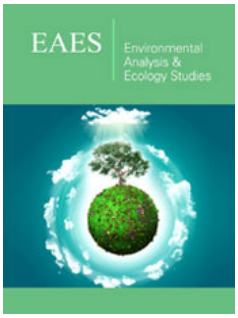

***Corresponding author:** Xu Hong Xu, First Institute of Oceanography, Qingdao 266061, China

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Abstract

As a genus of Cholorophyta in the family CodiaceaeUdoteaceae,Halimeda is an important alga in the tropical shallow seas around the world. As a representative plant molecule of the biodiversity of coral ecosystem, Halimeda is also an important producer of calcium carbonate and a kind of important reef-building plants. Based on a review of the recent ten years of investigation and research on Halimeda, this paper reports the ecological characteristics of Halimeda in the coastal reef of Shidao, Xisha Islands. We found in the shallow reef that the Living Halimeda recovered naturally after the stop of harbor construction and dust emission for 3 years, indicating that Halimeda was a sensitive indicator of the relationship between harbour construction and natural restoration of the environment.

Research Background

Among the producers of Marine calcium carbonate, Halimeda is highly respected. It is not only one of the main contributors of tropical and subtropical Marine calcium carbonate [1,2], but also forms Halimeda Proglottid rock through fossil proglottid. It is also an important reef-building plant in modern shallow seas of xisha Xisha islands [3,4]. In the world's oceans, such as Grand Bahama Beach, the Great Barrier Reef, the Caribbean reef area, the South China Sea, and other waters, Halimeda is widely found, widely distributed in modern reef sediments, the proportion can be up to 70%. As early as 1816, Lamouroux had noticed that Halimeda were common algae in the tropical shallow sea environment. They grew in a branching, segmented way, and many proglottids fell off and became carbonate sediments in the tropical shallow sea floor.

Ginsburg (1956) found in Florida that the sedimentary enrichment area of Halimeda was roughly similar to that of Coralline algae, distributed in the reef flat, Grey sand Island and lagoon bottom, and reached the maximum in the lagoon bottom behind the reef, forming a large area of growth. The Halimeda Bioherm was formed, which was mainly composed of Halimeda. Eventually, many of these mounds joined together to form the Halimeda Bank. In 1985, the sixth International Conference on Coral Reefs focused on the discussion of Halimeda, which attracted extensive attention from the Marine scientific community and led to a series of studies on it.

Vroom et al. [5] found that Cymbidium paniculata continued to grow at a rate of one node per branch per day and formed segments. The time to full maturity is 30 days or faster [5-9]. Nowadays, it has been recognized that the phytolith sediments are the main components of the tropical Marine sediments [1,10-12]. They may even contribute more to the carbonate sediment budget in tropical oceans than corals in coral reef ecosystems [2,13,14], and form basement deposits and improve the environment [6,15-18], becoming important builders of islands and carbonate platforms [19-28].

Through the research on the process and mechanism of the calcification of Halimeda, the impacts of environmental changes, such as ocean acidification, on the calcification of Marine

marine organisms, can be evaluated, including the physiological characteristics of Halimeda and the changes in the total calcium carbonate content [29-35].

In the process of ocean acidification caused by modern island and reef seaports construction and fishery production, the physiological response of Halimeda adapted to such acidification may change [36-40].

Series of Survey Findings

For the last ten years, our survey area has remained in the horseshoe-shaped Xuande Atoll, focusing on the shallow lagoon and its cay towards the northeast of Shidao island. The earliest sampling survey was conducted in 2012, and many samples were obtained within a short period of time. It is exciting and interesting to test and study them and compare their differences with fossil Halimeda reef [3,4].

This work continues to this day. During this period, construction of a public pier began one year later about 2 kilometers from the survey area; Persistent an investigation was carried out to observe and compare the distribution and the occurrence of Halimeda. Three years later, it was found that there was a decrease of the Halimeda in the survey area, and the collection of Udotea was carried out. A relatively new sampling survey was conducted in July 2019, and two species of Halimeda were found (Figure 1).

Figure 1: Two species of Halimeda were collected on July 21, 2019.7.

The latest survey was conducted in July 2020, validating the findings of the previous year's survey for the purpose. The underwater area shooting was increased to determine the large area covered by Udotea. It was found that the area of the broken wave zone in the investigated sea area was normal, but the chalky deposition was distributed outside the broken wave zone.

Conclusion

1. The scientific exploration well confirmed that the fossils Fossil Halimeda proglottid rock of were found in the research area of neogene Neogene in the period of 400 meters of geological history [4], indicating that Halimeda was the owner here in the period of geological history.
2. Before the construction of the port, Halimeda was lush; A large number indicates a good Marine environment.
3. Dust in the survey area should be the most an important factor for the influence of three years after the construction of the port.
4. Technology and method are important, and technological progress and continuous inspection and verification are indispensable.
5. The natural recovery capacity of the ocean is beyond imagination, and the area currently covered by chalky sediments is less than a few hundred square meters, located outside the rupture zone. Therefore, the rupture cleans the dirt and maintains the Marine environment.
6. In 3-5 years, the impact of harbor construction will be eliminated by the nature of the sea. Therefore, respecting and reverence nature is the highest concept of construction.

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