Oceanography & Fisheries
Open access Journal
ISSN: 2476-0536

Juniper Publishers
key to the Researchers

Mini Review
Volume 5 Issue 3 - December 2017
DOI: 10.19080/OFOAJ.2017.05.555664

Oceanogr Fish Open Access J


# A Summary of Research on Artificial Reefs Monitoring Technology

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**Submission:** October 15, 2017; **Published:** December 07,2017

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**Abstract**

In this paper, the status of oceanic pasture and artificial reefs are introduced. The development of oceanic pasture and artificial reefs monitoring in the word is presented. Development of monitoring technology is divided into three stages according to the history. The first stage is that divers observing the ocean and obtain information about marine organisms. The second stage is using sensor such as sonar, cameras, to observe the ocean and obtain information about marine organisms. The third stage is employing underwater vehicles in the monitoring tasks. Finally we propose that underwater vehicles will be the future trend of artificial reef monitoring based on the advantages of underwater vehicles in monitoring.

**Keywords:** Oceanic pasture; Artificial reefs; Monitoring; Underwater vehicle; Observing

## Status of Artificial Reefs

Currently, Artificial reefs are built around the world: Australia has built Artificial Rocky Reef Fish Communities in Botany Bay, New South Wales [1] French has but artificial reef in golfe juan marine protected area [2]. The United States has built artificial reefs from east and west coasts to the southern gulf of Mexico [3]. Japan's reef construction has a long history over three hundred years. National and local governments invest 60 billion yen per year on the construction [4] China has set up artificial reefs in Zhejiang province, Jiangsu province, Shandong province, Guangdong province, Guangxi province and other places. In order to observe the construction of artificial reefs and growth status of fish in reefs, we commonly use some methods, such as underwater naturalist, underwater photography, sonar, surface buoy and underwater vehicles and so on.

## Oceanic Pasture and Artificial Reefs Monitoring at Home and Abroad

Since the complex environment of underwater, it is dangerous for diver to dive in the ocean. Researchers considered a more secure and effective way to monitor ocean. In the second stage, the researchers relied on sensor such as sonar, cameras, to observe the ocean and obtain information about marine organisms. Shyue [4] made research on the distribution of artificial reefs by using multi beam echo sounder. Tian [5] investigated the physical status of artificial reefs by means of a side-scan sonar system. Cuevas [6] introduced the managed Artificial Reefs in Mississippi by using utilizing Side Scan Sonar. Decologne [7] described a technological project to observe submarine that was deployed an autonomous bottom moored acoustic observatory within Bay of Biscay coastal zone. Takahashi [8] made quantitative surveys of fish assemblage at a high-rise artificial fish reef by stationary underwater cameras. Sarria [9] used acoustic communications which placed inside artificial reefs to detect the presence of the species while they are inside. Collins [10] introduced subsea wireless technology which transmitted wirelessly between a seabed sensor and a surface buoy to monitor seabed. Huang [11] calculated indexes of fish resource, through method based on dual-frequency identification sonar. The use of sensor greatly improved the researchers' understanding of artificial reefs and oceanic pastures.

In China related research develops in a slow space. Deng [12] proposed that applying side sweeping to monitor position and height of artificial reefs and Liu [13] calculated the volume of artificial reefs in Dalian by using side sweeping system. Xu [14] proposed that monitoring sea cucumber and sea urchin in the artificial reef of Haizhou Bay by using underwater stereo camera. Liu [15] integrated monitoring and evaluation techniques to apply in the habitat island and artificial reef area. Xing [16]

designed a set of video systems for real-time monitoring of oceanic pastures. Shi [17] monitored water quality in the South China Sea by using surface buoy. Wang [18] proposed a complete set of submarine cable online observation system for oceanic pastures which located in weihai xixiakou oceanic pastures to online monitor ecological environment. However, there are no researchers in China designed and manufactured underwater vehicles specifically for artificial reefs monitoring.

## Conclusion

In this paper we introduced the development of oceanic pasture and artificial reefs monitoring in detail. This general technology may exist obvious disadvantages in monitoring. We suppose that the underwater vehicles are better tools for monitoring and underwater vehicles will be widely used in future for artificial reefs monitoring.

## Acknowledgment

This work was supported by Natural Science Foundation of China (NO.51679213), National Key Research and Development Program (2016YFC0300801) and Zhejiang science and technology innovation team project (2013TD14).

## References

1. Burchmore JJ, Pollard DA, Bell JD, Middleton MJ, Pease BC, et al. (1985) An ecological comparison of artificial and natural rocky reef fish communities in botany bay, new south wales, Australia. Bulletin of Marine Science 37(1): 70-85.
2. Pascaline B, Catherine S, Charbonnel E, Patrice F (2011) Monitoring of the artificial reef fish assemblages of golfe juan marine protected area (france, north-western mediterranean). Brazilian Journal of Oceanography 59(spe1): 167-176.
3. Huifei Liu (2001) Current situation of Japanese artificial reef construction (in Chinese). Modern Fisheries Information 16(12): 15-17.
4. Shyue SW (1998) Preliminary study on the distribution of artificial reefs by using multibeam echo sounder. Oceans IEEE 2: 1144-1148.
5. Tian WM (1998) The application of side-scan sonar system in monitoring benthic artificial reefs. International Symposium on Underwater Technology IEEE, 312-316.
6. Cuevas KJ, Buchanan MV, Moss D (2002) Utilizing side scan sonar as an artificial reef management tool. Oceans IEEE 1: 136-140.
7. Scalabrin C, Diner N, Veron G, Choqueuse D (2005) Autonomous bottom moored acoustic observatory for fisheries resources monitoring. Oceans IEEE 1: 201-205.
8. Takahashi H, Matsuda A, Akamatsu T, Takagi N (2007) Quantitative Surveys of Fish Assemblage at a High-rise Artificial Fish Reef by Stationary Underwater Cameras.
9. Sarria D, Molino E, Del Rio J, Manuel A, Sarda F, et al. (2011) Monitoring species using acoustic communications. Institute of Electrical & Electronics Engineers 30(1): 1-5.
10. Collins A (2013) Application of subsea wireless technology to environmental monitoring. Oceans IEEE pp. 1-5.
11. Huang R, Han J, Tong J (2014) Assessment of fishery resource of a marine ranching based on a DIDSON. Oceans IEEE 4: 1-5.
12. Xianming D, Chunhui T, Chunyan S (2006) Application of side - sweep sonar and shallow stratigraphic profile in site selection and monitoring of artificial reef (in Chinese). Chinese Geophysical Society, China.
13. Yonghu L, Min L, Tao T, Jun Y, Yong C (2017) Application of Side - scan Sonar System in Volume Estimation of Stone Artificial Reef (in Chinese). Journal of Fisheries of China 41(7): 1158-1167.
14. Qiang X, Libin Z, Hui L, Lu S, Qinzheng X, et al. (2013) Monitoring and Evaluation of Resource Repair Effect in Typical Bay Reef (in Chinese). Cross-Strait Marine Fishery Resources Conservation and Co-Development of Young Scientists Seminar Abstracts Summary.
15. Hui L (2014) Study on bio-resource monitoring and assessing techniques and application in offshore island area with artificial reefs (in Chinese). University of Chinese Academy of Sciences, China.
16. Xufeng X, Gang W, Mingzhi L, Yong C, Tao T (2017) Design and Realization of Integrated Monitoring System for Marine Ranch Environment Information (in Chinese). Journal of Dalian Ocean University 32(1): 105-110.
17. Yao S, Hui L, Yongqin L, Wencai D, Yaafei Y, et al. (2017) Design and implementation of multi-parameter intelligent monitoring system for marine ranching (in Chinese). Transducer and Microsystem Technologics.
18. Zhibin W, Peiliang L, Yanzhen G (2017) Development and application of the online observation platform for the ecological evironment of marine ranching (in Chinese). Meteorological, Hydrological and Marine Instruments 34(1): 13-17.


**DOI:** 10.19080/OFOAJ.2017.05.555664




**How to cite this article:** Daxiong J, Mingzhe S, Sanjay S, Hongjun P, Shiqiang Z. A Summary of Research on Artificial Reefs Monitoring Technology. Oceanogr Fish Open Access J. 2017; 5(3): 555664. DOI: 10.19080/OFOAJ.2017.05.555664