

Evaluation of Marine pasture fishery production based on big data in the context of low-carbon economy

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Abstract. Modern Marine ranching is a new sustainable production mode of Marine fishery, which plays an important role in the transformation and upgrading of Marine fishery in China. However, the Marine ecological environment is increasingly damaged, Marine living resources, especially economic species, the scope of offshore and traditional fishing grounds is constantly reduced, and the quality of aquaculture degradation, which are reflected in different degrees in both fishery developed countries and fishery developing countries, and eventually lead to a series of social and economic problems. And with the development of modern information technology, oceanic ranch produced all kinds of big data is growing fast at the speed of visible to the naked eye, cause for storage of data cannot be timely and effective, without all the data storage, data is not found in time, the relationship between the and the stored data is not fully development and utilization of their potential value. Therefore, this paper sorted out the construction status and existing problems of modern Marine ranches in China, and put forward corresponding construction plans for the development of Marine ranches in China from the perspective of the government, so as to make up for the deficiencies in the evaluation and research of Marine ranches in China at the present stage and provide theoretical guidance for the construction of Marine ecological fisheries.

Keywords: Marine ranching, Big data, Low-carbon economy.

1. Introduction

China is not only a country with a large population, but also a large maritime country, and Marine fisheries are an important part of ensuring China's food security. To develop the Marine economy and build a Marine power, it is necessary to care about, understand and plan the ocean from the perspective of national strategy. At the same time, developing Marine low-carbon economy and building Marine ecological civilization is an inevitable choice to promote the scientific development of the Marine economy, and also an important measure to implement the construction of ecological civilization and develop the Marine economy [1].

Marine ranching is a fishery model based on the principle of Marine ecosystem. In a specific sea area, artificial reefs, proliferation and release measures are taken to construct or repair places needed for Marine organisms to reproduce, grow, bait or avoid enemies, proliferate and conserve fishery resources, improve the ecological environment of the sea area, and realize the sustainable utilization of fishery resources. Through the scientific use of sea space, enhance the productivity of sea areas, establish an ecological, well-planted, engineered and high-quality fishery production and management model, and realize a new Marine fishery business form that integrates land and sea and connects three industries.

Carbon sink fisheries, that is, through fishery production activities, promote the absorption of carbon dioxide from water bodies by aquatic organisms and remove carbon out of water bodies by harvesting aquatic biological products. Carbon sink function is the function of many Marine resources including fishery resources [2]. However, fishermen pay too much attention to the amount of fishing, which brings economic benefits, and have a serious lack of understanding of concepts related to Marine ecological health and low-carbon environmental protection. Therefore, the urgent task of China's Marine fishery science and technology work is to study and explore a new mode of Marine

fishery production, and carry out fishery production scientifically while repairing the Marine ecological environment and conserving Marine living resources.

Under the current policy background of China's strong support for the development of Marine ranches, the successful construction of Marine ranches not only requires the government to reasonably analyze its comprehensive benefits when investing and managing Marine ranches, but also requires the academia to put forward targeted development plans. Scientific planning and management of modern Marine ranches can restore and optimize the ecological environment, multiply biological resources and maintain Marine biodiversity, and at the same time, develop Marine fisheries and Marine biological industries in a healthy and efficient way, so as to ensure the safety of Marine food supply and Marine ecological security for the Chinese people. At the same time, the ecological and environmental value of biological carbon sequestration can be realized through scientific and reasonable low-carbon farming, which kills two birds with one stone and is of great importance to the sustainable development of China's Marine fishery and even Marine industry [3].

2. Sea ranching in the context of big data technology

With the rapid development of information technology, all walks of life have taken informatization as the construction target of the industry. As a result, the amount of data generated in all fields of the world has increased rapidly. According to IDC forecast report, daily average generation 491EB data; Among them, China will become the largest data circle, accounting for 27.8 percent of the world. The emergence and development of big data promotes the formation and prosperity of digital economy. Using big data technology to maximize the value of data resources will become an important development direction of China's information technology.

At present, most industries in China are actively responding to national policies, applying big data technology to this field, and carrying out corresponding big data platform system research and development, such as smart ocean, smart transportation, smart city, healthcare and so on [4]. It can learn and refer to the research and development experience of relevant big data platforms in other fields, realize the design and research of the big data platform of ocean ranch, and promote the transformation and upgrading of ocean ranch.

According to the business requirements of the sea ranch big data platform and the existing aquaculture system, the sea ranch big data platform is divided into five parts, each of which corresponds to different functional applications. The specific information is shown in Figure 1.

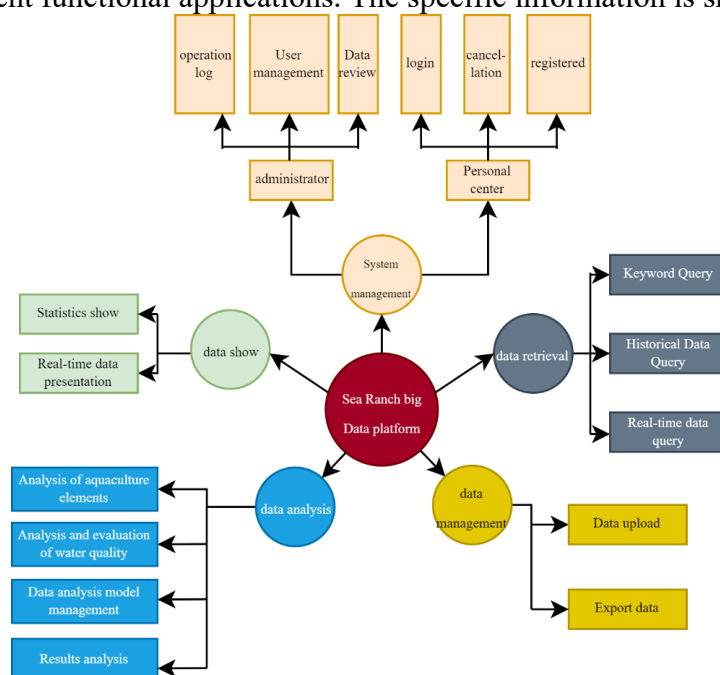


Figure 1 Ocean Ranch Big Data Platform

3. Development history and current situation of Marine ranching

Since around 1970, China began to build Marine ranching, and through artificial reefs and proliferation and release as the main means of aquaculture, the damaged ocean was restored and managed, so as to improve the productivity of aquaculture and the sustainable development of the environment [5]. At that time, China's Marine fishery resources were in serious decline due to overfishing and habitat destruction. After the rapid development of Marine ranch construction, it is necessary to slow down its development speed, and promote the rapid development of Marine ranch construction to high-quality development from the aspects of technological innovation, enterprise management and government, so as to realize the sustainable utilization of Marine resources and the restoration of Marine ecological environment.

In the 1930s, the experiments of fish proliferation and mark release were carried out in the coastal areas of Zhejiang and Jiangsu and gradually promoted. In 1979, China's first group of experimental single artificial reefs was launched in Qinzhou, Guangxi, marking the beginning of China's practical exploration of Marine pasture construction. In the 21st century, inspired by the construction of Marine ranching in South Korea and Japan, and the call of the academia for Marine farming and herding in the past 30 years, domestic industry departments, based on the implementation of the requirements of the Program of Action for the Conservation of Aquatic Living Resources in China, have promoted the development of the Marine ranching industry in China with government actions. At present, according to incomplete statistics, the total construction area of China's Marine ranches has reached 3 770 hm². From north to south, more than 20 Marine ranches have been formed or will be formed, such as the Marine ranches in western Liaoning Sea, Ningde Marine ranches and Shantou Marine ranches. Now, China has built a real sense of Marine ranching, and further built and improved the pasture detection system through environmental transformation [6].

4. The main problems of Marine ranch construction at present

4.1 The level of industrialization is generally low

In recent years, China's coastal provinces and cities to build a batch of Marine pasture, and make full use of the artificial reef and the proliferation of superposition effect, although very attaches great importance to the construction investment, but the lack of impact on the environment, ecological and other scientific quantitative evaluation of long-term monitoring, management and maintenance of wasn't up to the location specified by the oceanic ranch, industry development effect is not obvious, not form a good pattern of industry.

4.2 Key core technologies need to be developed

At present, the sea ranch industry lacks a relatively independent application basis, the research and development of sea ranch technology is relatively backward, and there is a lack of modern high-end technology with independent intellectual property rights, so the innovation ability needs to be improved urgently. At the same time, the lack of effective coordination and cooperation operation mechanism can not achieve the goal of three industries integration [7]. This has largely limited scientific progress in the construction of entire modern Marine ranches.

4.3 The management mechanism needs to be improved

China's Marine ranch construction is disjointed in the process of evaluation and planning, and lacks effective planning. At present, the development of Marine ranches in China is characterized by prosperity in the north and south, weakness in the middle, unreasonable layout, and unbalanced construction and development. The lack of effective management of artificial reefs built by social enterprises has led to confusion in the construction and management of some Marine ranches. The phenomenon of heavy construction over management still exists. Due to the lack of perfect

management system and mature management experience, the management of Marine ranches in many regions of China is not in place.

5. Comprehensive production evaluation of Marine pastures

5.1 Determination of evaluation index

According to the theories of resource constraint, ecological economy and regional differentiation, and according to the principles of scientificity, representativeness, purpose and operability, the index factors are selected from the three dimensions of economy, ecology and society to evaluate the comprehensive benefits.

Selection of economic benefit index: Economic benefit index is an important evaluation index to reflect whether Marine animal husbandry input can obtain corresponding economic returns. In addition to government subsidies, the main economic sources of sea ranching are aquaculture and fishing and coastal tourism revenues, of which the cultivation and capture of quality fish are the main components of fisheries revenues[8].

The Marine Ranch Economic achievement index reflects the overall level and scale of fishery production in a certain area in a certain period of time. The economic benefit index of Marine ranches reflects the utility relationship and relative quantity of inputs and outputs of Marine ranches.

5.2 Construction of evaluation index system

In order to calculate the comprehensive benefits of Marine ranching, according to the imperfect state of current Marine statistical data and related indicator data, statistical analysis is conducted on the existing indicators to determine their attributes, as shown in Table 1.

Table 1 Index property analysis table

Index layer		Nature
Ecological benefits	Maintain ecological balance benefits	Qualitative Indicators
	The catch is not up to the standard proportion	Quantitative indicators
	Number of national marine ranches	Quantitative indicators
	Environmental benefits	Qualitative Indicators
Economic benefits	Sea Ranch Economic Outcomes	Qualitative Indicators
	Economic benefits of marine ranching	Qualitative Indicators
	Degree of development of coastal tourism	Qualitative Indicators
Social benefit	Industrial development benefits	Qualitative Indicators
	Fishermen's Engel's Coefficient	Quantitative indicators

	Developmental Expenditure on Marine Fisheries	Quantitative indicators
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5.3 The key technologies needed to evaluate the indicators

Production assessment techniques for Marine ranches

Acoustic detection and evaluation technology using biological resources, establish the acoustic nondestructive testing and evaluation system, the fish resources in ocean pasture species identification based acoustic assessment method study, establishing species detection, classification and recognition system, by adopting the technology of biological investigation of fishing gear and fishing gear, ecological output capacity on the large farms breeding biology and environmental bearing capacity evaluation [9].

Marine pasture ecological environment creation technology

Improve artificial reef construction techniques, and systematically develop various artificial reef materials, structures and construction techniques. In terms of research and development of reef materials, the development and utilization of green and environmentally friendly reef materials are vigorously carried out, and the reuse of large industrial by-products such as blast furnace slag is explored [10]. Optimize seaweed field/seagrass bed restoration and creation techniques. To locate major macroalgae/seagrasses and explore their attachment and growth mechanisms and environmental and biological interactions in specific environments.

6. Conclusions

Ocean with the "wisdom" of China traditional ocean pasture construction management pattern already cannot satisfy the need of modern ocean pasture construction, in order to adapt to modern ocean pasture construction conditions, must implement sea ranch information as soon as possible, wisdom, and insist on ecological priority, strengthen overall multi-sectoral cooperation, establish a market-oriented operation and management mode, In order to promote the restoration of Marine ecological environment and the proliferation of Marine fishery resources and realize the sustainable development of Marine fishery, it is necessary to break through the problem of sea area ownership and establish the industrialization mode of China's Marine ranching according to local conditions.

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