

The Measurement and Management of the Impact of Marine Disasters on the Development of Offshore Marine Resources in China

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Abstract: The occurrence of marine disasters will cause huge losses to marine life, coastline, tidal flat and other resources, which will lead to a large number of deaths and serious impact on society. In this paper, by sorting out the domestic and foreign literature on the issue of maritime distress and the development and ecological protection of offshore waters, and comprehensively analyzing the current situation of China's marine development and offshore fishing management. At the same time, combined with the current situation of Coastal Disaster in China. The survey results show that marine disasters in the coastal areas of China have the greatest impact on marine living resources. On the basis of summarizing the influencing factors, the corresponding solutions are proposed to control the marine environment, economy, resources and other factors so as to provide technical support for the sustainable development of the coastal zone.

1. Introduction

The occurrence of marine disasters will have a serious impact on marine life, marine life and society. In recent years, the number of inshore fishing in China has been increasing, which has also brought great pressure to the sea area. The ocean is one of the important resources for human survival. On the land, it is widely distributed and has many kinds [1-2]. With the continuous improvement of the world's economic and social development level, global climate warming, sea level rise and other factors, people have gradually deepened their understanding of marine organisms and their biogeochemical cycle [3-4].

There are many influencing factors of marine disasters. Scholars at home and abroad have studied them from different angles and achieved fruitful results. When analyzing the pollution status of China's coastal waters, some scholars pointed out that the characteristics of low dissolved oxygen

content, variable acidity and alkalinity, easy to be infected by marine organisms and microorganisms, small-scale mariculture, staggered distribution of coastline and large and long coastal beach area lead to frequent occurrence of red tides [5-6]. Other scholars have investigated and analyzed seven key rivers in the South China Sea, and the results show that there are obvious differences in seawater quality concentration in different regions due to the great impact of economic development level and regional differences. In addition, the water quality of some areas is not optimistic. Although some river sections are polluted to a certain extent, they are generally poor, with low cleanliness or even poor. Therefore, based on marine disasters, this paper studies the measurement and management of offshore marine resources development in China.

The occurrence of marine disasters will cause incalculable losses to mankind, and how to reduce or even avoid the huge impact on marine life and seabed resources has become a topic worthy of attention. In this paper, the linear regression model and the unit root value method are established to build a systematic study on the recovery and utilization of marine resources and the protection of ecological environment balance in the case of pollution in China's coastal waters. The results show that to a certain extent, due to the limitation of marine climate conditions and economic development level, a large amount of marine products will enter the ocean, which may also pose a potential threat to marine life and seabed resources.

2. Discussion on the Measurement and Management of the Impact of Marine Disasters on the Development of Offshore Marine Resources in China

2.1. Marine Resources Development

The development of marine resources refers to the effective comprehensive treatment and protection and reasonable planning of the sea breeze sea area based on the carrying capacity of the marine environment through the use of modern scientific knowledge, technology and management, so as to form a new economic growth point under the condition of restoring or improving the ecological environment. In terms of connotation, the first is to transform and upgrade the land [7-8]. Including seawater desalination engineering and coastal embankment technology. The second is to make an effort to dredge the sea surface and repair the shallow sea and take effective measures to ensure the normal development of the coastal waters and the safety of the marine environment. The third is to develop and protect marine resources, improve utilization efficiency, reduce waste and reduce pollution levels to achieve the sustainable development goals. The fishing activities carried out in various coastal provinces and cities have become one of the important factors affecting the development of the coastline and the construction of ecological security and stability. It includes the selection of suitable coastlines and the development of new coastal zones from the construction of offshore projects. The sea area is vast and contains rich, diverse and complex types. A variety of resource forms, such as multi angle and vast and boundless ecological space systems, are distributed in the marine environment in the sea. Among them, the offshore water area refers to the area that can directly affect the structure, function and biodiversity of the terrestrial ecosystem [9-10]. Fig. 1 is a diagram showing the relationship between marine resources development and economic development.

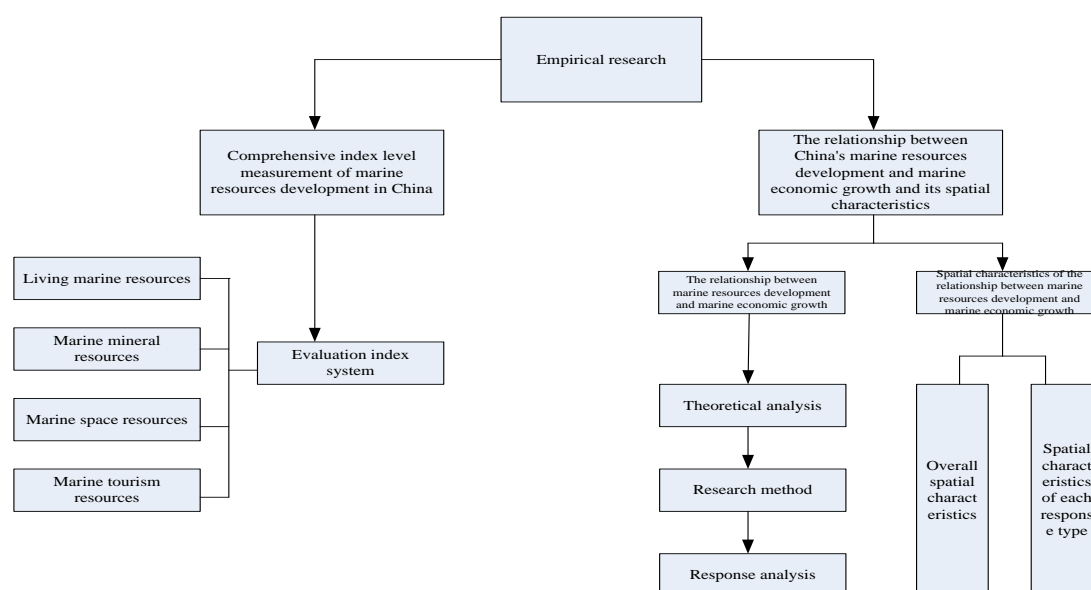


Figure 1. The relationship between marine resources development and economic development

At present, countries all over the world have generally taken measures in coastal governance, such as strengthening the management of coastal waters, strengthening the construction of underwater equipment and facilities, and improving the marine traffic environment, to promote the healthy and sustainable development of coastal fisheries and fishing industry. In addition, they have also developed and comprehensively utilized marine resources, so as to realize the recycling and comprehensive treatment of seawater and achieve the purpose of protecting the marine ecological environment.

2.2. Circulation System of Marine Resources Development

As the process of marine resources development is complex, changeable, long-lasting and uncertain, we should pay attention to the circular development when making rational use of the ocean. At present, there are two government departments in China, namely, the marine administration department and the Sea Area Administration Bureau. Among them, the marine management organization refers to China Coastal Fisheries Commission [11-12]. Its functions include: organizing and coordinating relevant national laws and regulations on offshore fishing and aquaculture, taking charge of the treatment of water pollution problems in relevant sea areas, supervising the domestic water, water quality and sewage discharge of coastal fishermen, and regularly reporting to the superior water environmental protection agency for the development and utilization of marine resources. In the process of developing marine resources, various aspects are involved, such as environmental governance of offshore waters, coastline management and fishing. Therefore, it is very important, urgent and necessary to establish a reasonable and effective circulation system. First of all, we should start from the source. Secondly, we must strictly control the water quality and maintain the water quality before fishing operations to ensure the safety of mariculture. The development of ecological fishery production and the quality of marine environment are the key factors that determine whether the marine products can develop sustainably. Carrying out fishing operations and aquaculture in China's sea areas will make the sea water lose its original use value. Therefore, in order to achieve the goal of shoreline protection, restoration and utilization, it is necessary to carry out reasonable and scientific transformation of marine organisms. For example, the population density of offshore organisms can be improved by artificial breeding

and fish culture in shallow sea. Finally, we should strengthen the supervision and inspection of the exploitation and utilization of marine resources and regularly report relevant information, so as to find major accidents and hidden dangers in a timely manner, reduce losses and ensure the maximization of economic benefits.

2.3. Impact of Marine Disasters

The development of marine economy is an important part of our national economy, and it also affects the living standard and health quality of residents in coastal areas to a great extent. With the acceleration of social industrialization, the deepening of urbanization and the gradual increase of people's demand for fishery resources, the "three wastes" produced by a large number of fishing industry have led to the deterioration of water quality in the sea area. Mariculture pollution has become one of the effective ways to restrict the improvement of environmental quality and maintain ecological balance in offshore waters. However, the occurrence of marine disasters will cause damage to the coastline of Shanghai to a certain extent and form a series of marine ecological problems [13-14]. For example, seawater pollution, beach wetland degradation, etc. A large number of red tides and storm surges occur in coastal areas, especially in the coastal sea area, and the continuous expansion of the coastal zone and serious damage to marine biological resources due to the influence of ocean currents will have a huge negative impact on the economic development in China's sea areas, even threaten the safety of the marine environment, cause major losses, and seriously hinder the sustainable, healthy, stable and rapid progress of human society, At the same time, it will also destroy the marine ecosystem on which people live. Marine disasters will have a direct impact on the growth and development of marine organisms, seaweed and other organisms, and will also lead to the decline of their yield and quality, or even the extinction [15-16]. For example, a large number of seawater intrusions have occurred in China's coastal waters, mainly including coral reefs, mangroves, coral reefs in other sea areas and shallow sea clastic rocks. With the improvement of human living standards and the progress and development of fishing technology, the development and utilization of coastal resources are tense, the marine environment in coastal areas is seriously polluted and the water quality is deteriorating. The destruction of the sea, land and water functions leads to the loss of marine biological congenital defects. Figure 2 shows the components of marine disasters in China's sea areas.

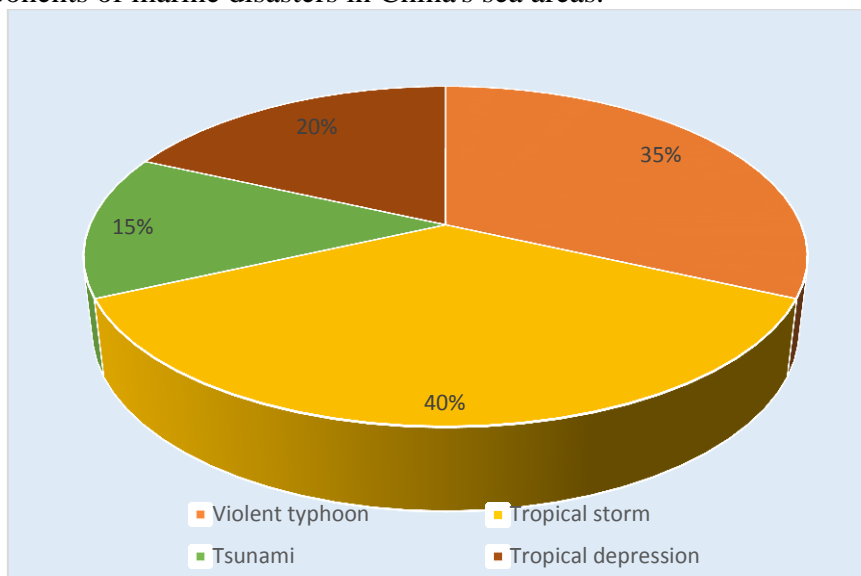


Figure 2. Marine disaster composition

2.4. Marine Resources Data Processing

When processing marine resource data, first of all, input the sea state information into the statistical software and calculate the relevant parameters [17-18]. Then, the index system of marine disaster impact degree is established according to these parameters, and the weight of each factor and the value of correlation coefficient matrix A, B, I and the critical state GW and critical time (ODEs) under a certain distance between FW are determined by using the comprehensive index method. Then, the data are converted into the corresponding standard value C by analyzing different types of marine resources. Due to the large difference in the measurement indicators of the comprehensive index of marine resources development, in order to eliminate the impact of other non effective components on the measurement results, the data are first processed in a unified and standardized manner. The processing formula is as follows:

Normalization formula of positive indicators:

$$x_{ij} = \begin{cases} x_{ij} - \min x_{ij} \\ \max x_{ij} - \min x_{ij} \end{cases} \quad (1)$$

Standardization formula of negative indicators:

$$x_{ij} = \begin{cases} \max x_{ij} - x_{ij} \\ \max x_{ij} - \min x_{ij} \end{cases} \quad (2)$$

Where I and j refer to provinces and years respectively, X is the standardized value of the index, $0 < X_i \leq 1$. Because factors are variables rather than linear combination relations, they can not be applied to the actual situation to calculate and propose solutions. At the same time, this method only studies the quantitative relationship and influence degree between variables and factors and the functional expression of the influence of various factors on the results.

3. Survey Process of Measurement and Management of the Impact of Marine Disasters on the Development of Offshore Marine Resources in China

3.1. Impact Process of Marine Disasters on Marine Resources Development Measurement

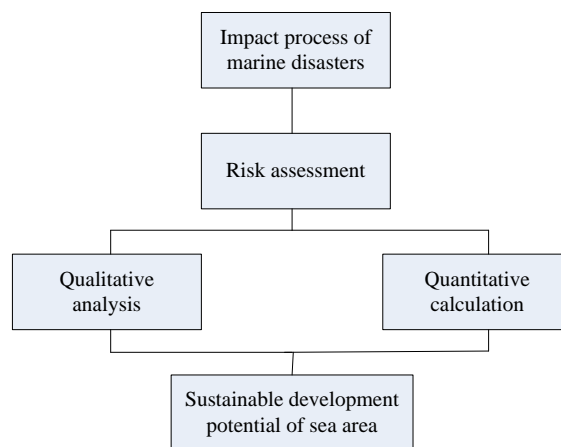


Figure 3. Measurement process of Marine resources development

As shown in Fig. 3, the impact process of marine disasters on the development of marine

resources is mainly divided into three processes: first, risk assessment, that is, through the qualitative analysis and quantitative calculation of various possible geographical, economic and social environmental factors and the formulation of corresponding countermeasures to cope with them; second, it provides a basis for the determination of reasonable planning and implementation scheme and the next step. After that, the comprehensive evaluation index system is established and the monitoring network is applied to classify the risk level. At the same time, different levels of defense plans are formulated according to the characteristics of the marine environment and the effects are analyzed to achieve the prevention and control purpose. Therefore, this paper puts forward the following evaluation index system, water quality, ecological restoration, development and utilization of marine resources, and sustainable development potential of the sea area, so as to more clearly reflect the current situation and future trend of marine pollution in China's coastal areas.

3.2. Marine Resources Development and Management Survey

(1) Determine the specific evaluation index system, formulate a detailed plan, and decompose the objectives and tasks into several small objectives. Each group will be evaluated after each major project is completed.

(2) Decide whether to continue to implement the project according to the obtained evaluation results. If this stage is not successful, relevant measures shall be taken immediately to deal with it or the construction and development of the project shall be stopped until the marine resources can be effectively utilized. If problems are found in the evaluation process, they must be corrected in time and corresponding punishment shall be made to ensure the smooth progress of all work.

(3) Determine the location of key areas and establish the specific location coordinate relationship of each key point, establish the underwater wave data database based on the field survey data, conduct comprehensive analysis and Research on the marine resources development project and evaluate its feasibility plan, so as to formulate a scientific and reasonable management plan and realize the strategic deployment of sustainable development of the sea area.

4. Survey and Analysis on the Measurement and Management of the Impact of Marine Disasters on the Development of Offshore Marine Resources in China

4.1. Investigation and Analysis of Impact Degree of Marine Disasters

Table 1 is the survey and analysis of the impact degree of marine disasters.

Table 1. Influence degree survey

Marine disaster category	Serious	Moderate	Mild
Typhoon	55%	23%	22%
Tropical depression	45%	36%	19%
Tropical hurricane	65%	18%	16%
Tsunami	29%	31%	30%

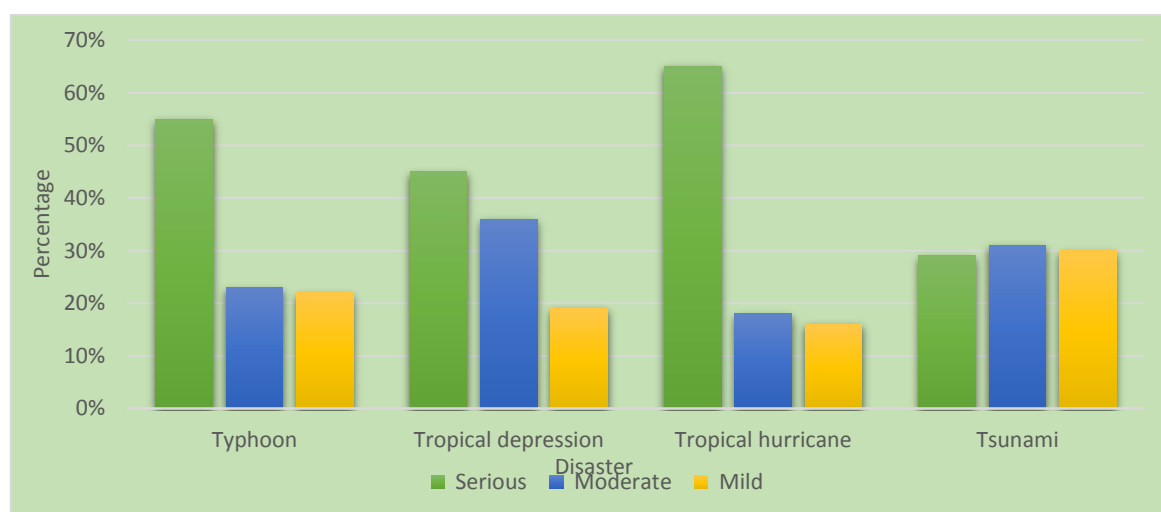


Figure 4. The extent of the impact of the Marine hazards

The frequency of marine disasters is related to the sea area, climate environment and human activities. From the statistical results (as shown in Fig. 4), we can see that the marine disasters in the coastal areas of China have the greatest impact on marine living resources. This shows that the Chinese government should strengthen the communication and coordination with relevant departments concerned about the pollution of offshore waters, and pay attention to it. At the same time, it should also realize that a series of ecological damage and other problems caused by the improvement of people's living standards in recent years have caused serious damage to the marine ecological environment. Therefore, it is necessary to promote the improvement of China's marine environment and the achievement of the objectives of coastline protection.

5. Conclusion

Marine disasters have a great impact on China's economic development and social stability. It is also an important, complex and sustainable problem. Based on the analysis of the main natural environmental conditions and the current situation of marine biological resources development in China's offshore waters, this paper discusses the impact of the marine environment on marine organisms and China's marine disasters by consulting data and field investigation and analysis, combined with the relevant offshore data in the statistical yearbook. The mathematical model is established by statistical method and the fuzzy comprehensive evaluation method is used to study the disaster degree of coastal areas in China.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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