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Protection Methods of Marine Ecological Environment Resources from Economic Perspective

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Abstract

At present, large-scale and high-intensity marine development activities brings great pressure on the marine ecological environment. Scientific and reasonable development and utilization for the ocean is an inevitable requirement to achieve the sustainable development of marine resources. Therefore, a method of marine biological ecological environment resource protection from the perspective of economy was put forward. It was necessary to coordinate the interest relationship between economic development and environmental protection. Firstly, the monitoring technology of marine biological ecological environment was researched to obtain typical and comprehensive multi-source monitoring data, and thus to figure out the state of marine biological ecological environment. On this basis, ecological compensation was carried out, including the measurement of marine ecological loss, the measurement of marine ecological compensation, and the construction of ecological compensation system dynamics model, so that the optimal scheme of ecological compensation was obtained and marine ecological environment protection was achieved. In order to test the effectiveness of protection method, the coordination degree between the economic development and the environment protection of marine biological ecological resources was calculated. Simulation results show that the coordination degree is more than 0.9 after using the propose method, which is much higher than that before the implementation, so the proposed method can ensure the economic development and protect the marine ecological environment well. The contradiction between economic development and environmental protection is resolved.

Keywords

Economic perspective; Ocean; Bio-ecological environment; Resources; Protection method.

Introduction

Ocean is the most important resource endowed by nature. It not only contains abundant water resources, aquatic resources, petroleum and mineral resources, but also includes natural resources necessary for the survival and development of human society. With the development of land resources in recent years, land resources have been exhausted, so the marine environmental pollution is an unavoidable reality. In order to realize a beautiful China, it is necessary to solve all kinds of environmental problems and coordinate the interests of all aspects, so as to build a dynamic and harmonious ecological social system. In essence, marine environmental pollution is the response of conflict, contradiction and disharmony. It is also a comprehensive reflection of disharmony factors in environmental protection and economic development. How to protect the ecological environment while developing economy is a dilemma faced by many countries? There is a close relationship between economic growth and ecological environment. It is a long-term dilemma to ensure economic growth and development of ecological environment. On the one hand, rapid economic growth will lead to the continuous increase of pollutants, resulting in the decline of ecological environment quality. On the other hand, the decline or deterioration of ecological environment quality will limit economic growth (Elliott et al., 2017). Therefore, how to solve the contradiction between economic development and environmental resources protection has become the focus of researches.

In order to solve above problems, a method of marine biological ecological environment resources protection from economic perspective was proposed. This method realized marine environmental protection while ensuring economic development. It is the premise of marine protection to master the state of marine environment, so it is necessary to monitor the marine environment. In addition, it is necessary to develop marine monitoring technology and build a reasonable monitoring network, so as to obtain typical multi-source monitoring data and make clear the ecological environment status. On this basis, the ecological compensation is carried out (Naama et al., 2018). Eco-compensation aims at protecting and sustainable using for ecosystem services. More specifically, the ecological compensation mechanism is to protect the ecological environment and promote the

harmonious development of human and nature. It is a public system that adjusts the interest relationship between the stakeholders of ecological protection by means of government and market, according to the service value of ecosystem, the cost of ecological protection and the cost of development opportunity. The basic process of ecological compensation is shown as follows: firstly, it is necessary to calculate the amount of ecological compensation and determine the standard of marine ecological compensation. After determining the compensation standard and understanding the specific situation of the area to be compensated, it is necessary to select the appropriate and feasible compensation methods in full consideration of the local economic development level, market development level and financial tax revenue, so as to ensure the effective implementation of marine ecological compensation. In order to test the effect of marine biological ecological environment resources protection method from the economic perspective, taking a coastal zone as an example, the coordination degree between economic growth and marine ecological environment protection in this region is calculated. The results show that the coordinated development level of coastal zone is rising as a whole. The coordinated development level is gradually higher, and the coordinated development level between the ecological environment and the economy is getting better and better (Islam et al., 2017).

Protection Methods of Marine Biological Ecological Environment Resources from Economic Perspective

With the deepening of China's reform and opening up and the coastal development strategy, the economy of coastal area is developing rapidly, but coastal area is undergoing the most serious environmental cost. The coastal area is one of the areas with the most serious environmental pollution. The study on the control measure for marine environmental pollution will help to improve the environment of coastal area and promote the overall governance of environmental pollution (Michael et al., 2017). Due to the particularity and complexity of marine environment, it is difficult to improve the marine environment after being polluted in a short time, and the marine environmental pollution has caused immeasurable harm to the coastal economy and residents. The complexity and particularity of marine environmental pollution require us to understand the ecological civilization and scientifically establish the ecological civilization view. By analyzing the underlying problems in marine environmental pollution control, this article put forward the effective measures to control the environmental pollution, and thus to construct the long-term mechanism of controlling pollution. Therefore, this article proposes a method of marine ecological environment resources protection based on economic perspective.

Research on Monitoring Technology of Marine Biological Ecological Environment

In order to protect the marine ecological environment, it is necessary to monitor the marine ecological environment. Marine ecological environment monitoring is a series of activities that continuously provide information of the pollution level and environmental status of marine ecological environment. Its basic goal is to know well the influence level of natural factors and human activities on the development trend of the function and structure of marine ecosystem. The result is to master massive data that can reflect the environmental quality, and coordinate the relationship between marine ecological environment protection and economic development (Edwige, 2018). As the "pioneer" of marine environmental protection, the marine ecological environment monitoring is the key to environmental management, which is mainly reflected in following aspects:

The implementation of marine ecological environment management system depends on the monitoring for ecological environment, otherwise the measures and systems will be superficial;

Accurate and timely understanding for the quality and status of marine environment is the basis of determining the targets of environmental decision-making and environmental management. The information comes from monitoring, if not, scientific management cannot be achieved;

Daily marine ecological environment monitoring is not only the basis of coastal people's life, but also the basis of preventing marine pollution accidents and marine ecological environment disasters. It provides the disaster reduction and prevention services and environmental information for human marine activities;

The assessment for pollution from land-based sources and marine environmental management relies on environmental monitoring. Otherwise, the level of environmental management cannot be improved.

Therefore, the marine ecological environment monitoring plays an important role in marine protection and management, and this role establishes its basic position in marine ecological environment protection (Walls et al., 2017).

Geographic Information System (GIS) is defined as an information system that collects, manages, analyzes and describes the geographic data distributed on the earth's surface by using system engineering theory and information science and taking the spatial data with geographic location attribute as the research core, with the support of computer hardware and software (Zuo, 2018). Its specific functions are shown in Table 1.

ArcGIS Engine is an important branch of GIS, which was launched by the Environmental Systems Research Institute of the United States in 2004. It was constructed and packaged to realize some functions of component library (ArcObjects) of a complete set of ArcGIS products. It is a convenient application kit in the development of C/S (client server) architecture

geographic information system (GIS). It is able to improve the efficiency of developers in program development. Meanwhile, ArcGIS Engine enables developers to write GIS desktop applications with targeted and customized requirements easily and quickly (Liu et al., 2017). The functions of ArcGIS Engine are shown in Table 1.

Table 1: Geography information function

Function	Specific description
Data collection and editing functions	Including graphic data collection and editing and attribute data editing and analysis.
The basic functions of geographic database management system	Definition of database, establishment and maintenance of database, operation of database, communication function, etc.
Mapping function	According to the data structure of GIS and the type of plotter, users can get vector map or grid map. GIS can not only output all element map for users, but also output various thematic maps according to users' needs, such as administrative division map, soil utilization map, road traffic map, etc. Some special geological analysis maps can be obtained by spatial analysis, such as slope map, aspect map, section map, etc.
Spatial query and spatial analysis functions	Including topological spatial query, buffer analysis, overlay analysis, spatial set analysis, geoscience analysis.
Terrain analysis function	Including the establishment of digital elevation model and terrain analysis.

Table 2: Basic functions of ArcGIS Engine

Serial number	Function	Serial number	Function
1	Map making	12	Select features by specifying a distance
2	Analysis and query	13	Ability to find and select elements through SQL statements
3	Coordinate system conversion	14	Query and search elements
4	Simple editing	15	Dynamic display of time series data and real-time data
5	Roaming and zooming of maps	16	You can select features by face or line selection
6	Click to view map elements	17	Manipulating the shape or angle of a map
7	Interactive operation of main geographic database and personal geographic database	18	Edit geographic features and attribute data
8	Annotate text with fields	19	Edit display drawing features
9	Display aerial or satellite images	20	Draw descriptive text
10	Through thematic map classification rendering, rendering by value, point density rendering and other methods to render elements	21	It can calculate differences and generate buffers through spatial operations, and can search, invert or combine intersecting parts
11	Layers display maps (such as administrative divisions, rivers, and roads)		

The monitoring process of marine biological ecological environment based on ArcGIS Engine is shown in Figure 1.

In addition to GIS monitoring technology, in order to achieve more comprehensive monitoring, some monitoring technologies have been developed successively, such as shipborne rapid monitoring, aviation remote sensing monitoring, underwater unmanned automatic monitoring, ecological buoy monitoring, UAV remote sensing. The specific characteristics are shown in Table 3 (Huang et al., 2017).

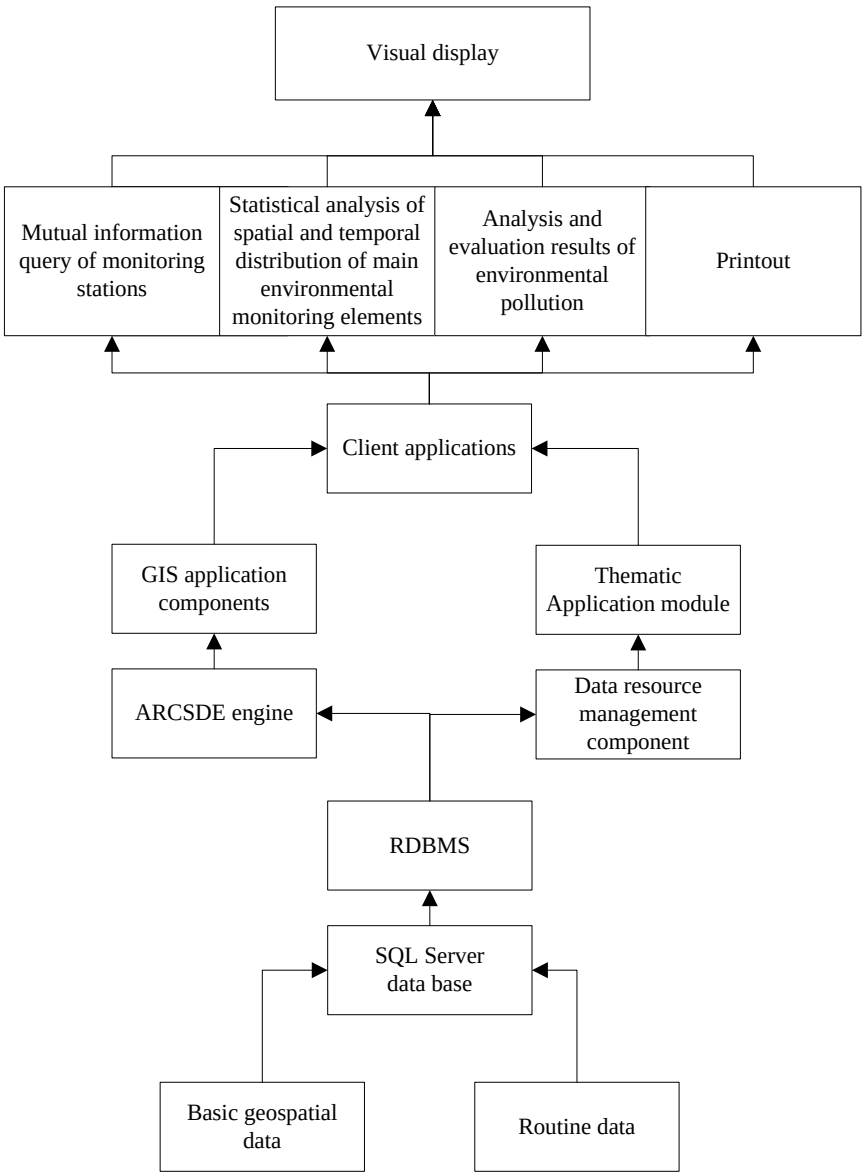

Figure 1: Monitoring process of marine biological ecological environment based on arcgis engine.

Table 3: Monitoring technology of marine biological ecological environment

Monitoring technology	Definition	Advantage	Shortcoming
Remote sensing monitoring	It mainly uses the received remote sensing satellite images to interpret and extract the marine environmental monitoring elements, and then analyzes the environmental conditions of the corresponding sea areas.	It can monitor the ocean in a large scale, which is beneficial to analyze the quality of marine environment from a macro perspective.	The image scale of remote sensing monitoring is small. The resolution is low, coupled with the influence of weather conditions, which limits the application effect of marine environment monitoring to a certain extent.
On board fast monitoring technology	Ship borne rapid monitoring is to obtain monitoring data through on-site sampling and on-site analysis. The monitoring data is sent to the data center in real time by Inmarsat-C satellite communication network to realize monitoring.	The data of Shipborne monitoring is more accurate, comprehensive and highly available. Shipborne monitoring can provide high data support for the analysis and evaluation of marine environmental conditions.	The cost of Shipborne monitoring is high, the time is long, the timeliness is low in emergency monitoring, and the coverage of Shipborne monitoring is small, but also affected and limited by weather conditions and sea conditions.

Buoy monitoring technology	Buoy monitoring is to carry sensors on the buoy carrier to monitor the corresponding marine environment elements, and send them to the data center in real time through the buoy communication system to achieve monitoring.	Buoy monitoring can carry out on-line real-time monitoring of the predetermined area, with high timeliness, little impact by weather and high degree of automation. Therefore, buoy monitoring is widely used in recent years.	The elements of buoy monitoring are few (mainly on Hydrometeorology and water quality), and the accuracy and accuracy of sensors need to be further improved.
Automatic monitoring technology of underwater unmanned station	The automatic monitoring technology of the underwater unmanned station is mainly to establish the automatic observation station of the underwater unattended marine ecological and dynamic elements in the coastal ocean station, to realize the continuous, fixed-point, automatic, all water layer monitoring and real-time data transmission of the main ecological and dynamic elements, to send the data to the data Center for data processing and analysis.	Fast monitoring speed, high efficiency and low risk	The data of this method is represented by points, and the coverage is limited. Therefore, the typicality and representativeness of the data are affected. At the same time, the field sampling is limited by weather conditions, which affects the real-time and continuity of the data.

All these improve the comprehensive ability of quasi real-time monitoring and information processing of marine ecological environment and provide the technical demonstration, and lay a foundation for the construction of comprehensive monitoring network of marine pollution and ecological environment.

Marine Ecological Compensation Mechanism

Ecological compensation is an institutional arrangement for protecting ecosystem services and adjusting the interest relationship of related parties mainly by economic means. At present, government compensation and market compensation are the main ways of marine ecological compensation. The specific forms are shown in Table 4 (Wang et al., 2017).

Table 4: Concrete form of expression for government compensation and market compensation

Compensation mode	Type
Government compensation	Administrative control
	Financial transfer payment
	Special fund
	Preferential credit system
	Collection and use of ecological tax
Market compensation	One to one deal
	Market trade
	Ecological mark certification

The main way of ecological compensation is still fund compensation. In order to ensure the effective implementation of marine ecological compensation mechanism, it is necessary to combine policy compensation, fund compensation and intellectual means. In general, the marine ecological compensation can be divided into the five steps. See Figure 2.

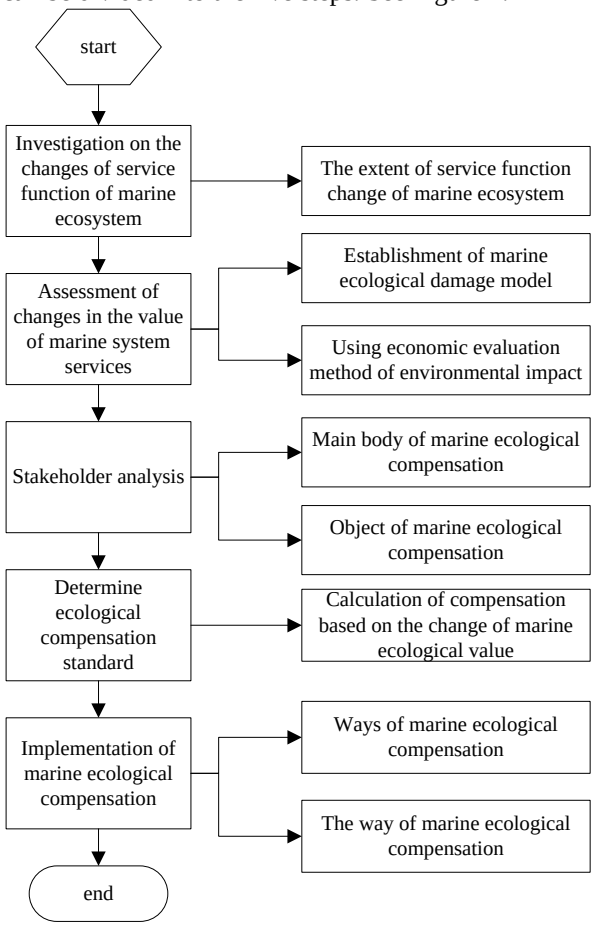

Figure 2: Marine ecological compensation process.

The measurement and determination of ecological compensation standard is the key link of ecological compensation, and it is also the difficulty of research. The research on this issue includes three parts: the calculation of marine ecological loss, the calculation of marine ecological compensation, the construction of dynamic model of ecological compensation system. After establishing the optimal scheme of ecological compensation, the marine ecological environment protection can be achieved (Chen et al., 2017).

(i) Calculation of Marine Ecological Loss

The over exploitation of marine resources has seriously damaged the service function of marine ecosystem and caused serious marine ecological loss. The over utilization of fishery resources, the pollution of mariculture, the pollution of marine oil spill, the development of marine engineering projects and the pollution of industrial and domestic sewage directly or indirectly affect the service functions of marine ecosystem, resulting in various forms of marine ecological losses. After analyzing the process of typical marine ecological losses, this paper uses the applicability of current environmental impact assessment methods to divide the marine ecological losses into the ten forms: loss of marine fishing food supply and service, loss of marine raw material supply and service, loss of marine aquaculture food supply and service, loss of marine environmental capacity service, loss of marine gas regulation service, loss of marine nutrient regulatory services and loss of marine biodiversity service (Vasilijević et al., 2017).

The measurement of the annual loss value of marine fishing food supply and service.

$$Y_{ft} = \sum_{i=1}^{n} \left(a_{1i} b_{1i} - a_{2i} b_{2i} \right) \tag{1}$$

In the formula, there are $i = 1, 2, ..., n$ kinds of fishery products. Y_{ft} is the annual loss value of marine fishing food caused by the marine ecological destruction? a_{1i} and a_{2i} are the outputs of the i th fishing product before and after the destruction. b_{1i} and b_{2i} are the market prices of the fishing product before and after destruction.

The measurement of annual loss value of mariculture food supply.

$$Y_{ft}' = cDE \tag{2}$$

In the formula, Y_{ft}' is the annual loss value of mariculture food supply; c is the annual fixed profit rate; D is the annual output value of per-unitcultivation area. E is the damaged area.

The measurement of annual loss value of marine raw material supply.

$$Y_{ml} = gHI \tag{3}$$

In the formula, Y_{ml} is the annual loss value for the supply of marine raw materials; g is the profit rate of the annual sales revenue of marine raw materials; H is the annual sales revenue of marine raw materials per-unit area; I is the area of the damaged sea.

The measurement of annual loss value of marine gas regulation service.

According to the photosynthesis equation, 1.19 g O_2 can be released and 1.63 g CO_2 can be absorbed when every 1 g dry matter is produced. Thus:

$$Y_{al} = \left(1.63 J_{co_2} + 1.19 J_{O_2} \right) KI \tag{4}$$

In the formula, Y_{al} denotes the annual loss value of marine gas regulation service; J_{co_2} denotes the cost of O_2 release; J_{O_2} denotes the fixed cost of CO_2; K denotes the marine primary productivity; I denotes the area of damaged sea (Doug et al., 2019).

The measurement of annual loss value of marine environmental capacity service.

$$Y_{vl} = \sum_{i=1}^{n} M_i N_i I \tag{5}$$

In the formula, there are $i = 1, 2, ..., n$ kinds of pollutants in a year; Y_{vl} is annual loss value of service for marine environmental capacity caused by pollution; M_i is average cost of treatment of the i th pollutant; N_i is annual environmental capacity of i pollutant in specific sea area per unit area; I denotes the area of damaged sea.

The measurement of annual loss value of marine nutrient regulation service.

$$Y_{yl} = \left(O_N P_N + O_p P_p \right) I \tag{6}$$

In the formula, Y_{yl} denotes the annual loss value of marine nutrient regulation service; O_N represents the removal cost of nitrogen and O_p denotes the removal cost of phosphorus; P_N and P_p represent the annual removal amount of nitrogen and phosphorus per unit area; P_p represents the area of damaged sea (Panu et al., 2018).

The measurement of annual loss value of marine biodiversity service.

$$Y_{dl} = UI \tag{7}$$

In the formula, Y_{dl} denotes the annual loss value of marine biodiversity; U denotes the annual loss value of marine biodiversity service per-unit area (replaced by annual willingness to accept loss); I denotes the area of damaged sea.

(ii) Measurement of Marine Ecological Compensation

The measurement of compensation amount for investment of marine ecological protection.

The compensation amount of marine ecological protection investment is able to make up for the total investment of protection construction. Therefore, the factor of investment cycle should be considered during the measurement. If the annual investment and construction cost is fixed as q, the period is t years and the discount rate is r, then the end value at the end of the t_{th} year should be considered when measuring the compensation amount S_1 of investment in marine ecological protection. Let's refer to the following model:

$$S_1 = q\frac{(1+r)^t - 1}{r} \tag{8}$$

In the formula, $\frac{(1+r)^t - 1}{r}$ is the final value coefficient of annuity (Bai et al., 2017).

The measurement of compensation for marine ecological loss.

The measurement of compensation for marine ecological loss with infinite influence period

If the influence period is t years, then the same marine ecological loss will be generated every year. The sum of present values of annual loss should be considered when measuring the total compensation. Therefore, the following model can be adopted:

$$S_2 = u_l \frac{1-\left[\frac{1}{(1+r)^t}\right]}{r} \tag{9}$$

In the formula, S_2 denotes the compensation amount of marine ecological loss; u_l is the annual marine ecological loss; $\frac{1-\left[\frac{1}{(1+r)^t}\right]}{r}$ is the present value of annuity.

The measurement of compensation for marine ecological loss with infinite influence period

If the ecological loss caused by marine ecological damage is an irreversible change, $k \to \infty$. Because $\lim \frac{1-\left[\frac{1}{(1+r)^t}\right]}{r} = \frac{1}{r}$, the compensation amount of marine ecological loss is equal to the value that annual marine ecological loss u_l is divided by the discount rate r. The model is shown as follows:

$$S_2 = \frac{u_l}{r} \tag{10}$$

The measurement of cost compensation for the development opportunity of marine ecological resources

In order to implement the marine ecological protection, the relevant stakeholders lost the chance to use the original resources to develop production and obtain income. It is necessary to compensate for the loss of development opportunity cost (Antonella et al., 2017). In the measurement of cost compensation for the development opportunity of marine ecological resources, it is necessary to use the total income within the remaining service life of marine resources as the compensation. The annual income occurs at different time points in the remaining service life of marine resources, so the time value of annual income should be considered to calculate the sum of current values. The specific model is shown as follows:

$$S_3 = \partial \frac{1-\left[\frac{1}{(1+r)^t}\right]}{r} \tag{11}$$

In the formula, S_3 is the cost compensation for the development opportunity of marine ecological resources. The remaining service life of marine resources is t years. ∂ is the annual income, which is constant? r is the discount rate.

(iii) Modeling of Kinetic Model of Ecological Compensation System

The whole modeling process of system is a comprehensive integration process from qualitative to quantitative. This process mainly includes system comprehensive analysis, system structure analysis, model construction, model operation and test, model evaluation and selection (Keunje et al., 2017).

The kinetic model of ecological compensation system in the Three Gorges Reservoir area is built and different schemes are set up. Generally, there are four schemes. Scheme 1: natural development. Scheme 2: environmental protection. Scheme 3: economic development. Scheme 4: technological innovation (Song et al., 2019). The optimal scheme of ecological compensation needs to combine with the actual situation of the protected area and to carry out the operation simulation of four schemes.

Simulation Experiment Analysis

Fujian Province has a coastline of 3700 kilometers. In 2015, the marine GDP reached 700 billion Yuan, accounting for 26.9% of Fujian GDP, so it is an important pillar of national economy in Fujian. With the rapid development of marine economic strategy in Fujian, the protection of marine resources and ecological environment is facing new challenges. The development and construction on large scale and the marine resources development and utilization activities are continuously carried out in coastal areas, resulting in a large number of pollutants. They are directly discharged into the ocean, resulting in the

continuous expansion of marine pollution, the continuous deterioration of water quality and the continuous damage to the marine ecological environment (Lucie et al., 2017). Therefore, this area adopted to carry out the simulation experiment.

Simulation Test Platform

MATLAB comes from the work of Dr. Cleve mole, a famous American scholar, when he taught linear algebra. When Cleve Mole taught the course of linear algebra in New Mexico University, he conceived and developed the MATLAB software (Matrix laboratory), which was introduced to the market by Mathworks in the early 1980s. MATLAB means the coming of a new era of scientific computing. Our test is based on MATLAB (Scofield et al., 2017).

Optimal Scheme of Marine Ecological Compensation in Fujian Province

Based on the data obtained by the monitoring technology, the ecological compensation mechanism was constructed. Under the MATLAB simulation operation, the simulation results of four schemes of marine ecological compensation in Fujian Province are obtained, as shown in Figure 3-Figure 5.

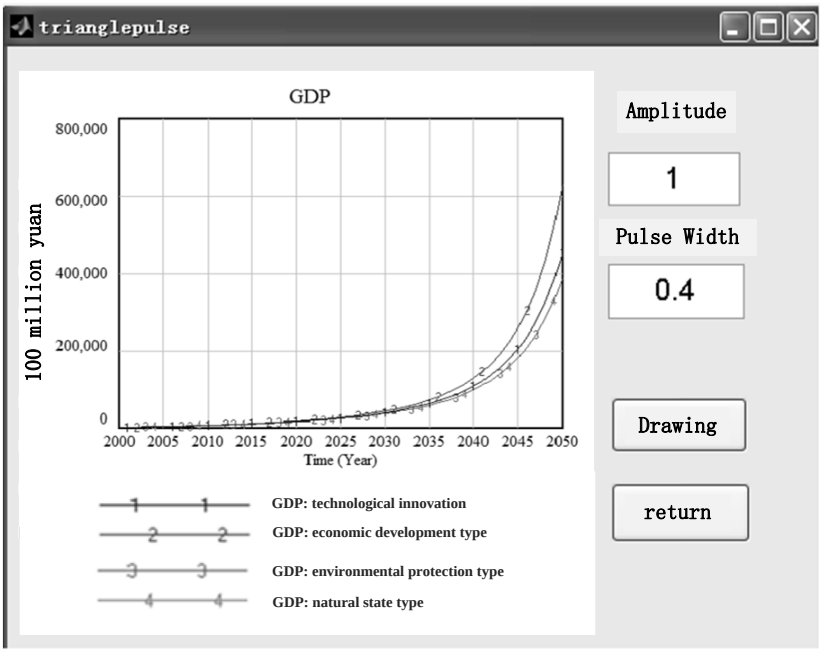

Figure 3: GDP simulation results of four schemes.

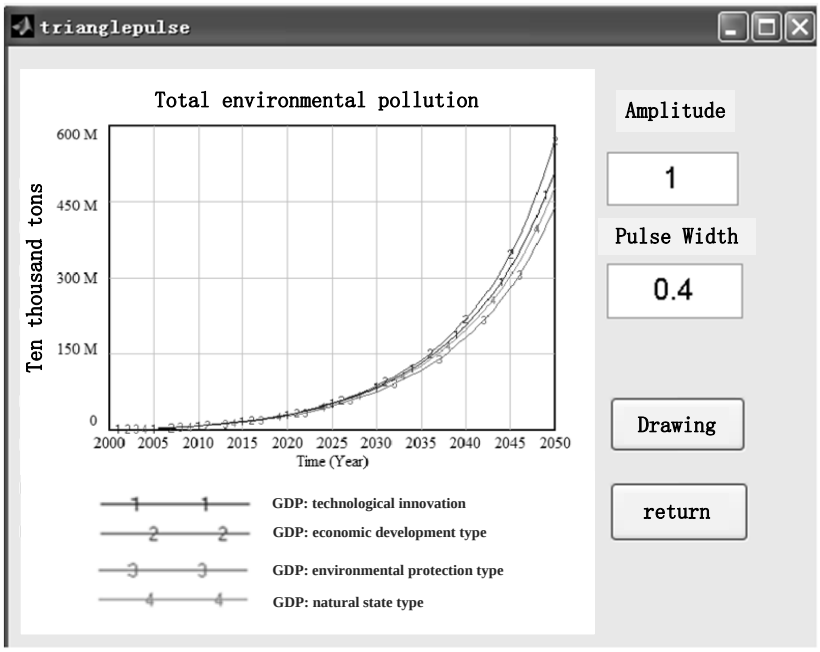

Figure 4: Simulation results of total environmental pollution in four schemes.

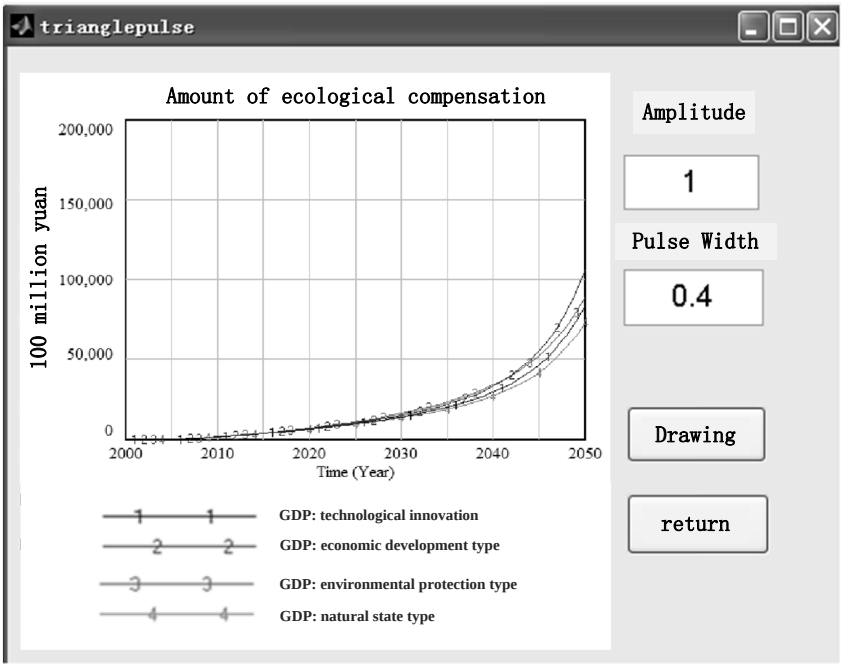

Figure 5: Simulation results of amount of ecological compensation in four schemes.

By comparing the simulation results of four schemes, it can be found that the GDP growth rate of economic development type is the fastest, but its growth rate of environmental pollution is also the fastest. Although the coastal areas in Fujian Province have rapid economic growth under this scheme, the environmental pollution problem has been ignored. Its growth rate of total amount of pollution emission of environmental protection type in these four schemes is the slowest, so it has effectively controlled the environmental pollution in the coastal areas of Fujian Province, but the regional economy has not been effectively developed. For the amount of regional ecological compensation, the amount of environmental protection compensation is the highest in the early stage, but in the later stage, with the increase of investment in fixed assets, the amount of economic development compensation become higher and higher. When establishing the ecological compensation mechanism in coastal areas of Fujian, it is necessary to carry out technological innovation and increase investment in fixed assets while strengthening the environmental protection, so as to promote the economic development, ensure sufficient ecological compensation funds for the follow-up development and promote the ecological compensation work.

Evaluation Index

After obtaining the optimal scheme of marine ecological compensation in Fujian Province, the optimal scheme was simulated and implemented in MATLAB, and then the coordination degree between economic development and environmental protection was tested. The degree of coordination is a quantitative index to describe the harmony and consistency between the elements among systems or the elements within a system in the process of system development. It reflects the trend of the system from disorder to order. In addition, it can be used to quantitatively describe the quality of system coordination. According to the concept, the coordination degree can measure the degree of coordination between environmental system and economic system in different development stages, and reflect the sustainable development of a region. Therefore, the computing model of ecological environment and economic coordination degree is deduced by the coefficient of variation. The coefficient of variation is also known as discrete coefficient, which is a quantitative indicator to measure the degree of variation or dispersion between two sets of data.

The values ($x_1, x_2, ..., x_m$) are m indexes to describe the economic characteristics. The values ($y_1, y_2, ..., y_n$) are n indexes to describe the ecological environment. $f(x)$ and $g(y)$ are the economic benefit index and the ecological environment benefit index. In order to make the economy and the ecological environment in a state of coordinated development, it is necessary to make the value of the variation coefficient kof comprehensive evaluation index $f(x)$ and $g(y)$ of economic system and ecological environment system smaller and smaller.

$$f(x) = \sum_{i=1}^{m} \alpha_i x_i \tag{12}$$

$$g(y) = \sum_{j=1}^{n} \beta_i y_j \tag{13}$$

In the formula, $f(x)$ is the economic growth index; $g(y)$ is the ecological benefit index. x_i is the

i_{th} economic growth evaluation index. y_j is the j_{th} ecological environment evaluation index. x_i and y_j are standardized values. α_i is the weight of i_{th} economic growth evaluation index. β_i is the weight of j_{th} ecological environment evaluation index.

$$k = \sqrt{2\left\{1 - \frac{f(x)g(y)}{\left[\frac{f(x)+g(y)}{2}\right]^2}\right\}} \quad (14)$$

It can be seen that the necessary condition for minimizing the value of k is: $k' = \frac{f(x)g(y)}{\left[\frac{f(x)+g(y)}{2}\right]^2}$ .The larger the value, the better the result. In order to discriminate the coordination degree, the formula of k' takes the δ_{th} power. In this way, the formula of coordination degree of economic growth and ecological environment system is obtained:

$$k = \left\{\frac{f(x)g(y)}{\left[\frac{f(x)+g(y)}{2}\right]^2}\right\}^{\delta} \quad (15)$$

In the formula, δ is the adjustment coefficient, $\delta \geq 2$. $0 \leq k \leq 1$, the value of coordination degree is between 0 and 1. If $0 \leq k \leq 1$ is closer to 1, the coordination between ecological environment and economy will be better. On the contrary, the closer $0 \leq k \leq 1$ is to 0, the worse the coordination between ecological environment and economy is.

Result Analysis

Table 5 shows that based on proposed method, the coordination degree between economic development and marine ecological environment protection in Fujian Province has been more than 0.9, which is much higher than that before the implementation of the proposed method. Therefore, the proposed method can achieve the protection of marine ecological environment while developing economy and solve the contradiction between economic development and environmental protection.

Table 5: Coordination degree

Project	Before the implementation of the method	After the implementation of the method
Coordination degree	0.920	0.725

Conclusion

In conclusion, the rapid development of economy also brings a series of ecological environment problems to the ocean. How to protect and improve the ecological environment on the basis of rapid economic development has drawn attention extensively. Therefore, this article puts forward a method to realize the protection of marine biological ecological environment resources from the economic perspective. This method includes two parts. The first part is to use the monitoring technology to determine the state of marine ecological environment. On this basis, the ecological compensation is carried out to achieve environmental protection. After the implementation of proposed method, the coordination degree between economic development and marine ecological environment protection has been more than 0.9. This method solves the contradiction between economic development and environmental protection and promotes the sustainable development of marine ecology.

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