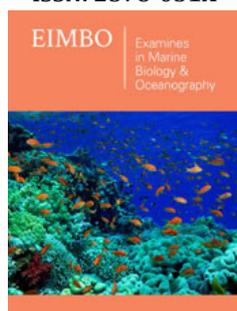


Cooperative Governance Mechanism of Coastal Ecological Environment Based on Multi-Agents

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Abstract

The coastal ecological environment is a highly coupled system of human land-ocean, which is highly complex and systematic. This is due to the biophysical and chemical characteristics of the terrestrial ecosystem, the natural characteristics of the ocean and the social characteristics influenced by human activities. Therefore, the coastal ecological environment governance needs a systematic management method, which comprehensively considers the natural and social characteristics of the land-sea interface, including the natural process of the land-sea interface, the relationship between human activities, the natural biogeochemical process of land and sea, and the influence of human on land and sea activities, and makes scientific decisions through the cooperation of multiple agent.

Keywords: Coastal zone; Ecological environment; Complex system; Cooperative governance

The Dilemma and Features

Coastal ecological environment is the most complex social ecosystem in the world. Land and sea are intrinsically linked through a variety of complex socio-ecological interactions [1-3]. Coastal and marine ecosystems play a key role in supporting the economic prosperity and social welfare of adjacent human communities, promoting human access to more marine ecological services. However, in recent decades, human activities have become more and more frequent in coastal areas, resulting in climate change, marine pollution and over exploitation of marine living resources, which has a serious negative impact on marine ecosystem. Some studies have shown that almost all marine ecosystems are affected by human activities, and 41% of them are seriously affected [4]. The increasingly serious marine ecological environment has attracted great global attention, and the voice of promoting marine ecological environment governance is increasing. However, the complex biophysical and chemical characteristics of land-sea and the characteristics of human activities pose a major challenge to governance, and the existing governance methods are often inappropriate, unable to reduce or reverse the improper impact of human activities [5].

Coastal ecological environment management is a very challenging systematic project, and systematic governance methods are also needed. In recent years, scholars at home and abroad continue to explore the methods of systematic governance, such as collaborative governance, network governance and other methods, but also encountered many problems: first, the property rights of resources are not clear. The ecological environment has typical public characteristics, once damaged, the cost of destruction is difficult to determine, and it is impossible to claim compensation. The second is the coordinated management of shared ecological resources. The third is the participation of different actors and knowledge systems. The knowledge structure of different stakeholders determines the level of participation in governance. The fourth, the lack of knowledge to solve or explain the interdependence between biogeochemistry (such as nutrient diversion) and Ecology (such as species movement) between marine and terrestrial systems [5]. Based on this, we need a social ecosystem approach to cross land-sea interface governance to match the complex characteristics and problems of

eco-environmental governance and formulate solutions. In order to solve the multi-level problems which are expected to threaten the land and sea system, the coastal ecological environment and social system should be taken into account, and the role of human beings should be considered comprehensively. Cooperative governance is usually considered as the first choice to solve the problem of coastal ecological environment governance [6].

Governance Process

In recent years, with the increasing popularity of interdisciplinary methods, the multi-agent cooperative governance method is more and more widely used in natural resource management and research and is considered to be an effective method to solve complex policy issues. Multi-agent cooperation can help researchers and decision makers better understand the status and dynamics of social ecosystems, thus improving the quality of research results and management decisions [7]. In essence, cooperative governance is an institutional mechanism to govern the whole ecological environment of the land sea interaction interface, and it is a kind of institutional arrangement and method for multi stakeholders to jointly promote the sustainable development of coastal ecological environment [8]. For example, Emerson and other scholars that cooperative governance is a process and structural arrangement. In a given policy or management field, when a single organization is unable to complete a given public affairs, complex arrangements across government departments, government departments, private sectors and social sectors are constructed. The participation of organizational support in this arrangement constitutes cooperative governance [9]. The cooperative governance in this paper follows Emerson's idea and extends it to the coastal ecological environment cooperative governance and considers that the cooperative governance does not take the absolute equality of subject status and power as the premise of cooperation.

The cooperative governance of coastal ecological environment is a process of multi-agents cooperation, which mainly includes government, enterprises, public, scientific research institutes, mass media and non-governmental organizations. In the cooperative governance of coastal ecological environment, whether the government, market, enterprises or the public from all walks of life are in the complex ecological environment of land and sea, all of which have to establish various connections with the ecological environment. The coastal ecological environment governance system is different from the general environmental governance. As an important part of the system, the uncertainty, complexity and public goods of the ocean determine that the government must play a leading role in the coastal ecological environment governance, which also leads to the asymmetry of multiple subjects in the whole coastal ecological environment governance system. This asymmetry is mainly manifested in the asymmetry of status and power. The multi-agents and its asymmetric relationship constitute the basic framework of the coastal ecological environment cooperative governance: the government is the leader in the ecological environment governance, and plays the role of the first responsible person to guide the stakeholders to express their opinions, provide

information, talk, bargain and vote on policy issues, agenda setting and program planning through individual or organizational means. Finally, a consensus was reached Wang Hui [10]. Enterprises are the main body of the micro market, whose main role is to allocate the ecological environment resources in the coastal zone in the market, maximize the income and efficiency according to the competition rules and market prices, and promote the establishment and improvement of the natural resource asset system. The public and non-governmental organizations are the smallest participants in the ecological environment governance, but their roles cannot be ignored. Cooperative governance is mainly playing the leading role of the government and sharing the responsibility of ecological environment governance with enterprises, markets, non-governmental organizations and citizens, and jointly managing the coastal ecological environment through institutional design and innovation.

However, the leading role of the government also has many disadvantages, especially the border problem of government participation in cooperation. If it is not clearly defined, it will cause many troubles: first, the power is too large. This will lead to other participants in absolute subordinate status, resulting in the governance process only the government has the final say; two, the government's power is too small, which will give the enterprise and the public excessive power, resulting in the profit seeking dominated enterprises and loose public overuse of the power in the hands, and decentralization of the cooperative governance effect.

Governance Mechanism

The essence and process of the cooperative governance of coastal ecological environment is the issue of social choice. The decision-making through the cooperative relationship directly determines the ultimate realization of land and sea ecological, economic and social goals. Therefore, the government must mobilize the enthusiasm of enterprises, communities, the public and non-governmental organizations (NGOs) to participate in the cooperative governance. With the help of cooperative governance, a strong joint force should be formed, and the pattern of multi subjects participating in the joint governance of coastal ecological environment should be constructed. The mechanisms that need to be constructed include:

Cooperation mechanism: In the process of ecological environment governance in coastal zone, due to the differences in rights and obligations, goal orientation, feedback mechanism and other aspects, the cognition and demands of ecological environment governance are quite different among the government, enterprises, the public and non-governmental organizations. The realization of cooperative governance of coastal ecological environment is to clarify the cooperative relationship among multiple agents, clarify the responsibilities and rights of the government, enterprises and the public, establish the governance mechanism of cooperation among the main bodies under the guidance of the government, and form a cooperation mechanism with clear division of powers and clear responsibilities.

Trust mechanism: Trust is the core of cooperative governance. The cooperation between multiple subjects is based on trust, and it is also achieved through trust. Hardin (2002) defined trust as a psychological state, in which an entity (client) accepts a certain degree of vulnerability (i.e., risk) based on positive expectations of another entity (trustee). In order to promote the realization of cooperative governance of coastal ecological environment, it must build a good trust mechanism. The government should take responsibility and transparency as the goal, prohibit rent-seeking behavior, enhance social responsibility of enterprises while pursuing profits, enhance the enthusiasm of public participation, and build a cooperative mechanism of mutual trust to jointly promote the governance of coastal ecological environment.

Collective action: The coastal ecological environment is the systematic management of the ecological environment problems in the whole land and sea process and between various fields. The cross-system threats originating from one field and influencing another and preventing or reducing the cross-system threats must be systematically managed and decided. Therefore, it is necessary for the government, enterprises, the public, scientific research institutes, mass media and non-governmental organizations to form a close and inter related cooperative relationship, establish a new alliance relationship, make joint decisions around the coastal ecological environment governance issues, formulate effective governance policies, put them into action together, and promote the common governance of governance.

Social learning: Modern ocean governance theory emphasizes that social learning is an important tool to effectively understand and explain the interaction between the subject and the environment in the process of governance. Social learning is a process of social interaction between people and social environment. In contemporary society, all governance subjects are in a certain social environment. With the continuous development of social environment, governance subjects need to learn constantly to improve their governance ability and level, so as to improve the scientificity of decision-making. Therefore, the government, enterprises, the public, scientific research institutes, mass media and non-governmental organizations need to keep learning in order to make feasible decisions to solve problems and strengthen governance.

Conclusion

The research on Cooperative Governance of coastal ecological environment is still in its infancy and has not formed a system yet. It has not been paid enough attention to which subjects participate in the cooperative governance, with whom to cooperate, and in what way to connect with the ecosystem structure, and how actors

can solve different types of ecological environment problems with the help of network. As for the coastal ecological environment governance which unifies natural science and social science, the academic community has gradually begun to study the coastal ecological environment governance from the perspective of social ecosystem / network. This method can construct the relationship between the coastal zone social ecosystem and achieve scientific governance. Under this research paradigm, it is necessary to understand whether, when and how the multi-agent cooperative governance based on the combination of natural characteristics and social characteristics can be realized effectively, so as to realize the effective governance of coastal ecological environment.

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