Research on Innovation of Information Collaborative Promotion Mode between Watershed Management and the River Chief System from the Perspective of Collaborative Governance

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Abstract: During the implementation of the River Chief System, river basin management organizations and local party and government organizations have their own responsibilities. Under the direction of water conservancy work in the new era, how to give full play to the respective advantages of River Basin Organizations and river lengths, learn from each other's strengths and complement each other's weaknesses, and coordinate the promotion of various tasks of river and lake management and protection is the key problem to be solved at present. Based on the theory of collaborative governance, this paper analyses the successful cases of water environment governance in river basins at home and abroad, and concludes that the key factors to achieve the effectiveness of the governance are the perfect legal guarantee and multi-subject collaborative governance. The problems existing in the regional cooperative governance, the principles to be followed in the cooperative governance of the water environment and the basic composition of the cooperative mechanism are discussed. On this basis, it is believed that the key to success is to do a good job in watershed ecological management and cooperative management, the integral management is an inevitable way, and social participation is the direction of optimization.

1. Introduction

Environmental pollution is an unavoidable and unavoidable problem in the process of Chinese modernization, of which river water pollution has become a pain in economic and social development. The purpose of the country's implementation of The River Chief System is to establish and perfect a long-term mechanism for the management and protection of rivers and lakes, to continuously improve the quality of water environment and to maintain the safety of water ecology [1]. Environmental governance and protection in the new era urgently need to strengthen the coordination and cooperation between relevant responsible subjects. The cross-border characteristics of rivers determine that river basin water environmental governance is one of the areas that most need coordination and cooperation among governments at all levels, different departments and the public. With the rapid development of Chinese economy, the rapid advancement of urbanization and industrialization, and the continuous expansion of urban scales, Chinese ecological environment has been severely man-made, and various environmental problems, especially water pollution problems, are more serious. This is densely populated. The eastern coastal areas with higher levels of urbanization are particularly prominent [2]. Therefore, in-depth analysis of the operation mechanism and experience of the River Chief System in the pilot area, and on the basis of summarizing local experience, explore the effective mode that can be replicated and promoted in the practice of basin management, so as to improve the governance mechanism of the basin, which is the current ecological civilization. Important content of institutional reform

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2. The Connotation of Collaborative Governance

Theoretically speaking, collaborative governance is a cross-cutting area between collaborative theory and public governance theory in natural science. In the view of cooperative governance theory, society is a complex open system composed of government, social organizations, enterprises, the public and other governance subjects. Each subject is a subsystem of this open system [3]. It regards the society as a complex open system, with the government, NGO, enterprise and the public as its sub-systems. From a macro perspective, the coordinated governance of public affairs includes not only the coordination between the government and other social subjects, but also the coordination between the governments. Watershed management generally refers to a multi-center governance model of multi-agent interaction and cooperation based on the overall interests of the watershed, government-led, social collaboration and public participation [4]. The essence of collaborative governance is to reduce the differences and conflicts in reality through the coordination of mutual relations in the process of dealing with complex social public affairs, to achieve common actions, coupling structure and resource sharing, and to promote the common interests of all parties at the lowest cost. The government's management method no longer relies solely on coercive power, but more is to negotiate and cooperate with NGOs, enterprises and the public, and actively guide other social governance entities to participate in public affairs, in order to achieve multi-agent collaborative governance and improve the science of government decision-making. Sex and execution effects [5]. From the perspective of collaborative governance, it is of great significance to analyze the implementation status of The River Chief System in China and to seek the path of innovation. Collaborative governance has a greater degree of fit with The River Chief System, and there are also differences.

3. The Necessity of Cooperative Implementation of River Basin Management and The River Chief System

3.1 Cooperative promotion of watershed management and The River Chief System is an inevitable requirement for the protection of river and lake systems

The main body of the River Chief System is the local party and government organizations. Regarding administrative divisions as the scope of management and emphasizing territorial management will inevitably result in fragmented management to a certain extent in the course of the implementation of the River Chief System, which is not conducive to the overall protection of rivers and lakes with river basin attributes [6]. Water quality improvement is an important goal of the River Chief System. China has a vast territory, different economic development, different pollution conditions and causes of rivers, and lack of a unified scale for water resources management. The deterioration of river ecological environment is, on the surface, a problem of water environmental crisis, but in essence, a reflection of the defects of river ecological governance system. Chinese river management system is basically based on the administrative management system. From the perspective of the system itself, The River Chief System was originally a product of the local government's water pollution crisis management, which rose to a national measure after nationwide promotion and became an important system guarantee to solve the water control dilemma in China [7]. In addition, due to the lack of national-level governing documents, for inter-provincial rivers, because they belong to different administrative regions, there is no institutional basis for collaborative governance under the existing institutional context. The segmentation of the current administrative system leads to the problems of regional segmentation, departmental segmentation and unclear responsibilities in river ecological management. Before the “The River Chief System” was implemented, this was the crux of the problem that watershed management had achieved little results.

3.2 The coordinated promotion of watershed management and The River Chief System is the duty requirement of watershed and local coordinated control

The main responsibilities of the river chief include water resources protection, water area shoreline management, water pollution prevention and control, water environment management, etc. As a new type of organization with multi-department cooperation and multi-unit integration, the office of the governor of the river lacks unified standards in terms of operation mechanism and working methods [8]. There is a chief leader and several deputy leaders in the administrative system at the same level. The system of leaders in charge under the responsibility system of the chief executive is implemented. The deputy leaders manage one system each and cannot issue instructions to other functional systems. The main responsibilities of the river basin management agencies include ensuring the rational development and utilization, protection, management and supervision of river basin water resources, verifying the pollutant carrying capacity of river basin waters, and managing and protecting the waters and their coastline. In terms of water environment management in river basins, the objects of treatment include water resources protection, water pollution prevention and control, water environment management, water coastline management and water ecological restoration, etc. It is difficult for any single government department or local government to solve these problems alone [9]. The purpose of collaborative governance is to coordinate the relationship among the subsystems, make them reach a consensus on public affairs governance, and make use of their own advantages to maximize social welfare. The implementation of River Chief System must adhere to the concept of holistic governance, adhere to problem-oriented, provide better living environment for citizens as the goal, and safeguard the ecological and environmental benefits of the whole society.

4. Analysis of the Realistic Problems in the Implementation of the River Chief System

4.1 Overdependence on administrative authority

It is not difficult to find that “The River Chief System” is simply the responsibility contracting system for river basin water environment management, which belongs to the vertical coordination mode of hierarchical system based on authority, whether from the Central Government's “Opinions on the Full Implementation of the River Chief System” or from the work programme of the River Chief System of various provinces and municipalities. The River Chief System requires local party and government leaders to act as river leaders, which really holds the “cownose” of river pollution control. However, the work orientation of the River Chief System management, which is dominated by local Party and government departments, is not very clear. During the implementation of the River Chief System, the Ministry of Water Resources entrusted River Basin agencies with the responsibilities of “guidance, coordination, supervision and monitoring”, but the specific content and requirements were not clear [10]. Most of the local development fails to correctly handle the relationship between economic development and ecological environment protection. It is not uncommon to sacrifice the ecological environment for economic development regardless of the environmental carrying capacity. Now it is necessary to change the development concept, and it will take some time for the river to grow. This has resulted in excessive reliance on leadership authority. The effectiveness of water environment management in a region is entirely determined by the importance attached by the main leaders of the local party and government, the amount of administrative resources available to them and the degree of supervision and investigation [11]. In addition, due to the cross-border flow of water between regions, the upper reaches of the river basin are always in a favorable position and can give priority to access to water resources, so the treatment of water pollution is not very active. Therefore, in order to realize effective river management, we should strengthen the communication and cooperation with the society and the market under the government-led system, and form a joint force of government, enterprises and society in river management.

Finding the similarity of likes between users becomes the key to recommendation. The user-based collaborative filtering algorithm mainly uses correlation coefficients, expressed as:

$$S_{\mathrm{j}} = \frac{1}{\sum_{i=1}^{n}(S_r)}, (0 < (S_{\mathrm{j}}) \le 1) \tag{1}$$

The average length of the user profile in the system, where j is the number of user ratings and H is the average length of all users in the system. Expressed by the following formula:

$$D_{\mathrm{j}} = \sum_{i=1}^{n}(H_P \times V_p) \tag{2}$$

It is used to distinguish the change of filling items in the user profile, and its S is the number of non-maximum scoring items in the user profile.

$$S(r_k) = \sum_{r_k \neq r_i} w(r_i) D_r(r_k, r_i) \tag{3}$$

The River Chief System is a path dependence of authoritative governance, i.e. strong vertical mechanism and weak horizontal mechanism, lacking horizontal integration and coordination [12]. With the in-depth development of the River Chief System and the changing external environment, this authoritative governance will eventually make the River Chief System practice highlight the fragmentation dilemma. The framework for fragmentation dilemma analysis is shown in Figure 1.

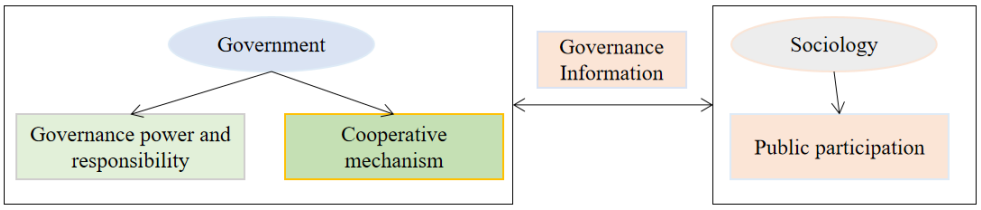

Figure 1 The River Chief System innovation fragmentation dilemma analysis framework

4.2 The system lacks flexibility

As local governments at all levels use their administrative authority to implement “The River Chief System” vigorously, strictly implement the management responsibility, and establish a strict system of assessment, rewards and punishments, “river length” has achieved good results in river management. The River Chief System “requires local party and government leaders at all levels to personally take overall responsibility for the ecological management of rivers. Under the leadership of the party committee and government, they should clearly divide the responsibilities of all wading management departments, so that the strength of all wading management departments can be newly integrated, thus forming a hidden water control network. In addition, it is true that the provincial plans stipulate that if there is a change in personnel, the successor will take over its role, thus ensuring the continuity of work. There is no denying that a successor, as a newcomer, needs a certain period of time to get familiar with the positioning and relevant situations before he can really enter the role. The higher-level government has made a detailed arrangement for the comprehensive water environment management of its subordinate governments through the target assessment responsibility system. This arrangement is also based on the rigid accountability mechanism, which is a great stick to the lower level government and its On the head of the relevant responsible person, the freedom-shaping space of the lower level is greatly limited. Some industries that emit more pollutants, such as papermaking, textiles, and metal washing, are mostly backward in production, and because of their concentrated pollution sources, they pose a great threat to water bodies in the basin, and the drawbacks of extensive economic growth methods are increasingly apparent; Establish an information sharing mechanism, improve the problem-solving work mechanism, timely discover

problems in river governance, and take effective measures to solve problems, reduce decision-making and execution costs, and improve work efficiency.

4.3 Lack of long-term governance mechanisms

"The River Chief System" is a measure that has been rushed by local governments by sudden water pollution problems. During the implementation process, the River Chief System office was established and a "road map" was drawn. The establishment of various "offices", "leading groups" and "commissions" in response to other emergencies is a temporary institution. However, in specific environmental protection practices, people often regard pollution as the inaction of the environmental protection department, and rarely to torture the government's responsibility. All localities have problems in the establishment of assessment accountability mechanisms, the inconsistency of the composition of the staff of the river chief office, and the imbalance in the construction of the information platform of The River Chief System. Watershed water environment management is a systematic project that is constantly being carried out. It requires not only a powerful drug that can quickly relieve surface symptoms, but also a good medicine that can be long-term conditioning and thorough cure. Local governments are under pressure to increase their own fiscal revenue and performance appraisal, so they must actively seek the economic development of the region, increase their support for local enterprises, and at the same time it is easy to form local departmentalism. In fact, the problem of water environmental pollution lies in the water. The root of the problem lies on the shore. The government is responsible for the remediation. Local governments have conflicts of goals and behavioral dilemmas in pursuing economic growth and fulfilling environmental responsibilities. The government's intentional or unintentional disregard of environmental responsibilities is the main cause of rivers' persistent ailments. The River Chief System itself and the temporary coordination agencies on which it is implemented are more emergency measures, bringing stable, comprehensive and long-term governance effects.

5. Innovation Path of Information Collaborative Promotion Mode between Watershed Management and the River Chief System from the Perspective of Collaborative Governance

5.1 Establish a trust mechanism to promote public participation

Trust is the prerequisite for cooperative governance. Holistic governance holds that the establishment of trust between organizations is a key integration to realize holistic governance, and it is important to establish a positive inter-organization relationship that forms mutual cooperation and trust among members. The full implementation of The River Chief System requires not only understanding its theoretical basis, but also improving the new water environment management system and system established around it. In the River Chief System, the local party and government principal responsible person acts as the "river length". It realizes the effective integration of resources of water-related functional departments, alleviates the conflicts of interests among departments, and improves the ecological management of river basins in a short time.

For the classification system, the category σ is represented by m as a vector, and the probability of occurrence of each class is v, The entropy of the classification system can be expressed as:

$$\sigma = \sqrt{\ln(1+\frac{v_r}{m^2})} \tag{4}$$

The system contains the feature μr, but the value of m has been fixed and cannot be changed. It is called "conditional entropy" and can be expressed as:

$$\mu = \ln(\frac{m^2}{\sqrt{v_r + m^2}}) \tag{5}$$

In view of the fragmentation dilemma existing in the in-depth development and reform of The

River Chief System, this paper, drawing on the connotation of collaborative governance theory, proposes to establish a trust mechanism, improve the integration mechanism, build a coordination mechanism and develop a comprehensive information management system to solve the fragmentation problem and promote the innovation of The River Chief System. The analysis framework of innovation path is shown in Figure 2.

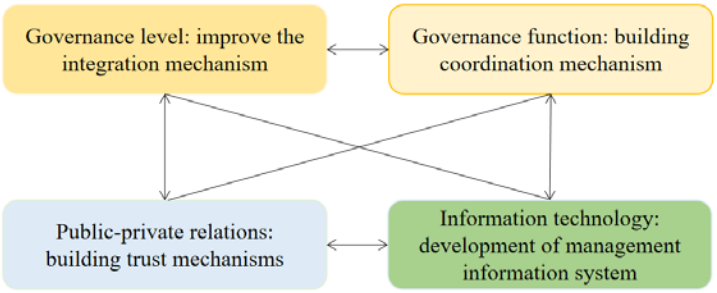

Figure 2 The River Chief System innovation path analysis from the perspective of collaborative governance

For the problem of transboundary water pollution in large watersheds, the central government should bear the major financial input and coordinate with all regions and departments. For regional water pollution problems, the local government is mainly responsible for the governance. With the help of media and public opinion propaganda, promote the public's recognition of The River Chief System and break down the concept barrier of public participation in The River Chief System. Secondly, full decentralization and smooth communication channels. By coordinating the responsibilities of governments at all levels and functional departments, we can build a water control system with mutual participation and cooperation, effectively improve the ability of governments at all levels to control water environment in river basins, and achieve good results in water pollution control. It integrates human, material, financial and intellectual resources to the greatest extent, forms a coordinated mechanism of unified deployment and joint operation, and solves the fragmentation problem in river ecological management.

5.2 We will improve the integration mechanism and form a networked organizational structure

Integration is one of the core concepts of Holistic Governance and the key to solving the fragmentation problem. Integral governance requires the government to form a networked organizational basis, i. e. a linkage mechanism that runs through the horizontal and internal links. We will fully implement the water resources management and control system, strictly adhere to the red line of water resources development, strengthen the leadership responsibilities of various departments and governments at all levels, and strictly implement the assessment and public supervision system. We will refine the work programme for water environment control and strictly control the prevention and control of point and non-point sources of pollution. Through the coordinated allocation of forces, the management of all levels of water environment in the basin has been carried out effectively, which reduces the cost and difficulty of decentralized management, and integrates and coordinates the resources of various water resources management departments. Therefore, the central government should also take corresponding financial support for the local government's governance projects, and encourage the local government's pollution control behavior through the transfer payment from the central government. If the management system is unreasonable, we should improve the allocation of public power and system design, and re-allocate responsibilities and post settings. If the implementation of laws and regulations is not in place, then functional departments should strengthen their sense of responsibility and perfect law enforcement methods. In the establishment of state organs, party committees at all levels have the highest authority and are the decision-making core of power. Governments at all levels are the executive organs of the Party's decision-making. Therefore, as long as the Party committee attaches importance to the matter, it will naturally become the government's desk work. Urge all localities to incorporate the implementation of the plan into The River Chief System evaluation index system; Supervise the provinces to

implement the basin master plan, the “three red lines” and the strictest water resources management system.

5.3 Build a coordination mechanism to promote multi-agent collaboration

Coordination is one of the core concepts of holistic governance. Coordination refers to coordination between government agencies for the development of joint and holistic work, joint information systems, inter-agency dialogue, joint planning and decision-making processes. At the government level, most executives pursue the idea of control, and from the perspective of social stability and government credibility, restrict public participation, even if participation is limited to the field, that is, symbolic participation. Therefore, in order to scientifically carry out river basin management and effectively manage transboundary water pollution problems, the functional departments of each region must proceed from the basin's integrity, according to the actual ecological carrying capacity of the basin, combined with the geographic location, economic industrial layout and water function of each region. The division of the district, etc., is to develop a comprehensive plan for the whole basin that is conducive to the overall development and protection of the basin and the rational and orderly use of water resources. At the same time, Party committees and governments at all levels should refine their laws and regulations on the performance of governance responsibilities, coordination and cooperation, performance appraisal and accountability. Through laws and regulations, such as the promulgation of the “Regulations on the Governance and Protection of Public Resources”, the responsibilities of Party committees and governments at all levels and different functional departments are clearly defined, and the obligations of coordination and cooperation are defined. Therefore, effective river pollution control and prevention should not only proceed from the integrity of the river basin, but also link natural ecology, economy and social development. “The River Chief System” uses systematic thinking to find a good way to harness the river ecology.

5.4 To develop a comprehensive information management system and promote the construction of network platform

Overall governance believes that the overall government and the overall governance reform need to be supported by digital technology. Through the comprehensive use of modern information and communication technology, the administrative process of the government should be integrated and simplified, so as to improve the efficiency of the government. That is, to ensure the efficiency of water control through reasonable resource allocation and active cooperative operations; The third is the effective enforcement effect, that is, to ensure the effectiveness of water control through scientific target design and effective enforcement measures. Under the guidance of this plan, the protection of water resources and the treatment of transboundary water pollution in different regions can be coordinated, so as to avoid over-exploitation and utilization of the basin and realize the positive interaction between economic development and environmental protection in the basin.

A set of variable scoring items, which is the set of scoring items given in the support attack model. According to the definition of Toe Attack Profile, different attack models have four components, and the set of variable scoring items is expressed as follows:

$$M_{\mathrm{k}} = c_k^d M_{k-1} \tag{6}$$

The score in the attack model is a random value under the positive distribution, which satisfies k>1. The function of the offset function is to generate an amount to modify the N value of the item i in the user profile T. The modified value is i0, and the offset function is expressed as:

$$T_r = \frac{1}{N}\sum_{i=i_0}^{k} r_i r_i^T \tag{7}$$

The government should formulate The River Chief System informatization plan, carry out hierarchical management according to the river grid management idea, coordinate the basic situation

of all rivers in the whole province, the identity information of river heads at all levels and their responsible river management status, the management tasks of various departments, river monitoring data, monitoring videos, etc., and respectively establish comprehensive information management systems for leaders at all levels, staff and the public, as shown in Figure 3.

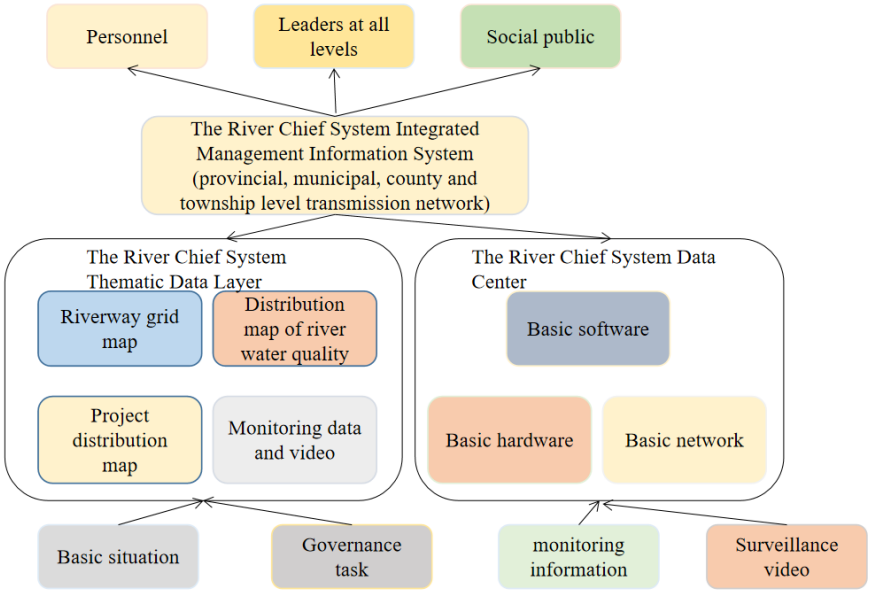

Figure 3 The River Chief System integrated management information system

Establish an information and resource sharing platform, stipulate that the government will share advanced river management experience in real time, regularly hold technical exchange and experience sharing meetings between various regions and departments, and promote the exchange of advanced river chief system management experience and management technology among various regions and departments. Through a series of reasonable, strict, practical and effective legal construction, the responsibility of the Party committees and governments at all levels for the governance and protection of public resources within their jurisdiction will be put into practice, so that they can be followed as one and applied for a long time, and the long-term implementation of the River Chief System will be guaranteed by legal means.

6. Summary

The problem of cross-border water pollution control shows the contradiction between basin management and administrative system. It is difficult to effectively control cross-border water pollution by strengthening territorial management and investment in capital and technology without changing the idea of local division. Based on the analysis of advanced river basin management experience at home and abroad, this paper puts forward corresponding countermeasures and suggestions from three different perspectives: legal level, administrative level and social level from the perspective of cooperative governance. In order to establish the legal status of “The River Chief System” and achieve long-term operation through the improvement of legal system construction. River ecological management is only one aspect of environmental problems. Under the increasingly severe situation of resources and environment ecological problems, how to apply the successful model of “The River Chief System” to other areas of environmental protection is not only the demand to implement the concept of green development, but also the inherent requirement to promote the construction of ecological civilization with Chinese characteristics. In a word, The River Chief System, as an important innovation of water management system in ecological environment, has a solid local practice foundation and strong vitality, and has important practical significance for maintaining the ecological health of rivers and lakes, strengthening the construction of ecological civilization in the new era, and realizing the sustainable development of social economy.

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