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## THE NORMATIVE CONSTRUCTION OF THE RIVER CHIEF SYSTEM MODEL OF RIVER BASIN WATER ENVIRONMENT MANAGEMENT UNDER LEGAL PERSPECTIVE

The River Chief System has been examined, a model for river basin water environment management implemented in China in recent years. Through a legal perspective, the authors analyze the normative construction of this system and its potential impact on improving the quality of river water. They give an overview of the historical and legal context that led to the adoption of the River Chief System, followed by a detailed description of its structure and key features. They evaluate the system's effectiveness in promoting compliance with water quality regulations and fostering inter-agency cooperation and conclude by identifying challenges that may hinder the system's success such as the lack of adequate funding and the need for greater public participation in decision-making processes. The paper provides valuable insights into the normative construction of the River Chief System and its implications for water resource management in China.

### 1. INTRODUCTION

The River Chief System (RCS) model is a governance model that was introduced in China in 2016 to address the issue of water pollution in the country's rivers. Under this model, a river chief is designated for each river basin to oversee and coordinate efforts to improve the water quality of the river. The river chief is responsible for coordinating the work of various government departments, local communities, and other stakeholders to address pollution sources and implement measures to improve water quality [1].

The importance of the RCS model lies in its ability to provide a comprehensive and integrated approach to managing the river basin water environment. The model promotes

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the involvement of local communities and stakeholders in the decision-making process and encourages collaboration and coordination among different government departments.

The objective of the case study is to analyze the normative construction of the RCS model of river basin water environment management from a legal perspective. The case study aims to examine the legal framework for water pollution control in China, the emergence of the River Chief System model, and the implementation of the model in a selected river basin. The case study also aims to evaluate the successes and challenges of the implementation and assess the legal implications of the model for water pollution control in China.

Public management emphasizes collaborative governance, which is critical when dealing with complex and uncertain public affairs, such as the management of rivers and lakes. However, collaboration between sectors, regions, and governments in water resources management is hindered by conflicting interests and challenges. Integrated water assets control (IWRM) is usually utilized in river basin control to coordinate the improvement and control of water, land, and associated assets. China has utilized the IWRM approach since 1988, but it has proven ineffective due to challenges such as operational difficulty, departmental conflicts, and lack of authority in river basin management. The Chinese government has had to reform the water management system using a top-down approach due to the failure of IWRM and the severe water crisis [2].

To address ecological and environmental issues such as water pollution, the construction of an ecologically sustainable civilization was proposed in the 18th National Congress of the Communist Party of China, which was integrated into the countrys Five-in-One plan. The 19th National Congress further emphasized the importance of tackling three major challenges: preventing and addressing significant risks, alleviating poverty, and reducing pollution. In particular, there was a strong focus on addressing environmental problems by accelerating the prevention and control of water pollution and implementing the comprehensive management of watershed environments and near-shore waters [3]. To support these efforts, the Chinese government has introduced a range of measures aimed at promoting the construction of an ecological civilization. One of these initiatives is the RCS which was creatively developed to address the multi-governance system for water protection and the shortcomings of conventional control mechanisms [4].

The RCS emerged as a potent tool for local environmental regulation in China designed to enhance water ecological and environmental governance. It represents a significant and innovative policy for environmental protection, independently implemented by various local governments across the country. The Wuxi city government in 2007, a response to the cyanobacteria crisis in Taihu Lake, initiated the introduction of the RCS. Impressed by its effectiveness, several other local governments followed suit, adopting this policy [5].

By 2018, the RCS had been fully implemented throughout China. Unlike other environmental protection policies in the country, the RCS stands out for its local government-led approach, wherein environmental protection responsibility is now integrated into the evaluation and promotion criteria for local officials. As a result, these officials can no longer overlook environmental pollution issues due to the assessment and promotion pressures they face. Consequently, there is a natural inclination for them to intensify efforts in environmental protection and allocate more resources to improve environmental governance [6].

## 2. HISTORY OF THE RIVER CHIEF SYSTEM

The Chinese government has been actively working towards the construction of an ecologically sustainable civilization to address various environmental problems, including water pollution. The 18th National Congress has proposed the construction of an ecologically sustainable civilization as a part of the country's Five-in-One plan. This was further highlighted in the 19th National Congress, which emphasized the need to address three major issues, namely preventing and addressing significant risks, eradicating poverty, and decreasing pollution [7].

To achieve this goal, the Chinese government has introduced a series of supporting measures, including the RCS initiative. RCS is an environmental governance system that aims to address the chaotic multi-governance RCS aims to address the disorganized multi-governance system for the preservation of water and the ineffectiveness of traditional regulatory mechanisms. RCS involves the implementation of river pollution control and policies through central and local initiatives [8].

Local governments have played a significant role in promoting RCS, based on the successful outcome of this environmental governance system. In the summer of 2007, Taihu Lake in Jiangsu Province experienced a significant outbreak of blue-green algae, which had a severe impact on the primary drinking water source of Wuxi City. To address this water crisis, the local government of Wuxi assigned the head officials of the CCP and the government as river chiefs responsible for 64 major rivers. This initiative produced remarkable improvements in water quality control, with the percentage of major rivers meeting water quality standards increasing from 53.2 to 71.1% within a year. This success demonstrated the effectiveness of the new system and led other provinces, including Zhejiang, Anhui, and Tianjin, to appoint CCP or government heads as river chiefs within their jurisdictions [4].

Following the water pollution control plan, river management was achieved by setting goals, breaking them down into smaller and manageable tasks, and delegating them throughout the governmental hierarchy (Fig. 1). Jiangsu province began nominating head officials as river chiefs throughout the entire province in September 2012, and the RCS continued to expand to other regions across China in subsequent years.

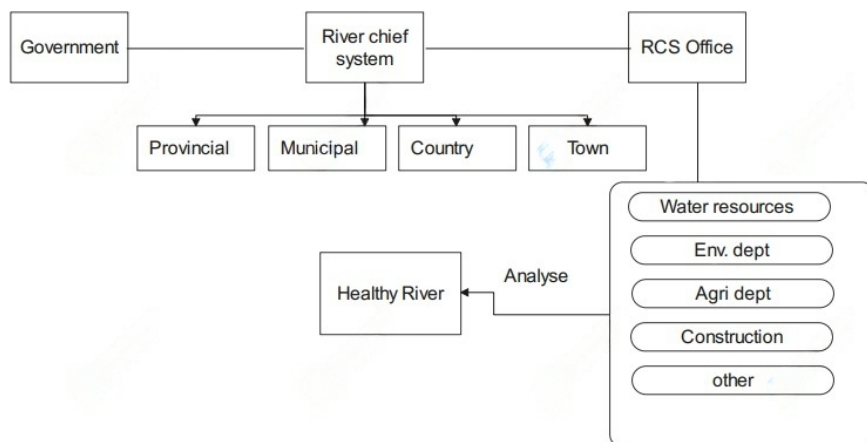


Fig. 1. River Chief System schematic view

By 2014, the water quality of Taihu Lake met the Grade IV guidelines according to Environmental Quality Standards for Surface Water in China. All principal drinking water sources and the entire water-quality sample from the 12 national evaluation parts all met the standard. Since then, additional areas across the country have experimented with the versions of RCS that have been implemented. With the release of the opinions on the comprehensive implementation of the RCS in December 2016, the RCS was elevated from an institutional innovation of local governments to a national water management plan. Consequently, RCS evolved from a crisis-response water management system to a proactive and long-term management system [9].

In 2016, the General Office of the CCP Central Committee and the State Council released a document *The Opinions on Full Implementation of the River Chief System (RCS) Across the Country*. This document outlined plans to protect water resources, control pollution, improve the environment, and restore natural communities nationwide. With the release of this document, it became clear that the RCS was no longer an emergent policy but a nationwide action. The RCS is a system that is rooted in China's top-down administrative system and is characterized by the hierarchical systems of the party and the state. This innovative system may provide an answer to the complicated water issues that China faces due to incomplete legal systems and insufficient judicial guarantees. The main tasks of the chiefs under the RCS include water resources protection, shoreline management, water pollution prevention and control, water environment management, restoration of water ecology, and law enforcement. However, the deployment of the RCS has faced challenges due to the non-statutory responsibilities of river chiefs, over-reliance on administrative power, trans-provincial management of rivers and lakes, and the lack of public participation and social supervision. Despite these challenges, the RCS has proven to be an effective method for solving complex collaborative problems in water management, which is deeply rooted in the country's unique political systems [10].

As of 2018, 31 provinces have established RCSs, with more than 300 000 river chiefs at the provincial, municipal, county, and township levels. Moreover, there are more than 760 000 river chiefs at the village level in another 29 provinces, achieving the goal of having a river chief for each river and lake. Overall, the RCS has been an effective approach to addressing water pollution in China which has evolved from a local government institutional innovation to a national water management strategy. The success of the RCS was evident in the improved water quality of Taihu Lake and the increased number of RCSs established in various regions throughout China [10].

As of 2023, the researchers discuss two main types of energy efficiency measurements: single-factor energy efficiency (SFEE) and total-factor energy efficiency (TFEE) [11]. SFEE is simply calculated as the ratio of desired output to energy inputs, but it overlooks the interplay between different production factors. On the other hand, TFEE considers multiple input factors like energy, capital, and labor, providing a more comprehensive evaluation of efficiency, but it does not account for undesired output [12]. To address this limitation, some researchers have introduced green total factor energy efficiency (GTFEE), which incorporates pollutant emissions into the calculation. GTFEE offers a more holistic and effective assessment of the economic energy systems efficiency compared to SFEE and TFEE [13].

### 3. MATERIALS AND METHODS

Hohai University is a prominent educational institution in China that offers a variety of majors related to water conservancy engineering and water environments. In April 2017, the Ministry of Water Resources provided support for the establishment of the Research and Training Centre for RCS at Hohai University. As the first research center in China entirely devoted to RCS studies, it takes advantage of the university's expertise and talent to promote theoretical and practical research in this area. The research center conducted a survey using literature reviews, data collection, and case studies. Water quality data was collected from national bulletins and weekly reports from the Ministry of Water Resources and the China National Environmental Monitoring Centre. The literature review included both domestic and foreign studies on RCS implementation in China. In addition, the authors referred to official announcements from the National Ministry of Water Resources and the National Ministry of Ecology and Environment, which gathered data from public resources like the National Water Resources Bulletin and the Health Status Report of Taihu Lake. The authors also analyzed legislation and implementation of RCS laws and regulations from the past three years and presented a summary. They participated in planning stages for the implementation of One River (or Lake), One Document and One River (or Lake), One Strategy for various rivers, held discussions with relevant scholars, government officials, and enterprise representatives, and summarized the developments, strategies, outcomes, and weaknesses of the RCS implementation. They offered possible solutions to solve the issues [14].

#### 4. NORMATIVE CONSTRUCTION OF RCS

The RCS model is a normative construction aimed at addressing water pollution and promoting sustainable management of water resources in China. The model was first introduced in the Water Pollution Prevention and Control Action Plan in 2015 and has since been enshrined in Chinese law through the Water Pollution Prevention and Control Law in 2018. In this model, the government designates officials as river chiefs responsible for managing and protecting their respective rivers [15].

*Legal basis for the model.* The Water Pollution Prevention and Control Law is the primary legal basis for the RCS model. According to the law, the RCS model requires that all levels of people's governments shall establish a responsibility system for water environment protection, and the system of river chiefs shall be implemented at the corresponding administrative levels (Article 7).

*Key features and components of the model.* The RCS model has several key features and components, including:

- **River chief appointment.** The government designates officials as river chiefs responsible for managing and protecting their respective rivers. The river chief is responsible for coordinating and supervising the work of relevant departments and units in the river basin.
- **River basin management.** The model emphasizes the importance of river basin management. The river chief is responsible for developing and implementing a river basin management plan that includes measures for water quality improvement and pollution prevention and control.
- **Cross-departmental coordination.** The model emphasizes the need for cross-departmental coordination. The river chief is responsible for coordinating and supervising the work of relevant departments and units in the river basin, including environmental protection, water resources, land and resources, agriculture, forestry, and fishery.
- **Public participation.** The model emphasizes the importance of public participation. The river chief is responsible for organizing public participation in river basin management, including public hearings, consultations, and information disclosure [3, 16].

*Roles and responsibilities of river chiefs.* The river chief has several roles and responsibilities, including:

- **Developing and implementing a river basin management plan** that includes measures for water quality improvement and pollution prevention and control.
- **Coordinating and supervising the work of relevant departments and units** in the river basin, including environmental protection, water resources, land and resources, agriculture, forestry, and fishery.

- Organizing public participation in river basin management, including public hearings, consultations, and information disclosure.
- Conducting regular inspections of water quality and pollution sources in the river basin [17].

*Coordination mechanisms for implementation.* The RCS model has several coordination mechanisms for implementation, including:

- Inter-departmental coordination. The model emphasizes the need for inter-departmental coordination. Relevant departments and units in the river basin are required to work together to implement the river basin management plan.
- Information sharing. The model emphasizes the importance of information sharing. Relevant departments and units in the river basin are required to share information on water quality, pollution sources, and river basin management.
- Supervision and inspection. The model emphasizes the need for supervision and inspection. The government is responsible for supervising and inspecting the work of river chiefs and relevant departments and units in the river basin.

The RCS model is a normative construction aimed at addressing water pollution and promoting sustainable management of water resources in China. The model has several key features and components, including river chief appointment, river basin management, cross-departmental coordination, and public participation. The river chief has several roles and responsibilities, including developing and implementing a river basin management plan, coordinating and supervising the work of relevant departments and units, organizing public participation, and conducting regular inspections. Coordination mechanisms for implementation include inter-departmental coordination, and information sharing [15].

## 5. LEGAL PERSPECTIVE

The RCS is a model of river basin management that was first implemented in China in 2017. It involves the appointment of local officials as river chiefs who are responsible for overseeing and enforcing water pollution control measures within their respective jurisdictions. While the system has received praise for its effectiveness in improving water quality, it also has legal implications that must be considered [18].

One of the legal implications of the RCS is the need to comply with national and international legal standards for water pollution control. In China, the Water Pollution Prevention and Control Law is the main legislation that regulates water pollution control. It sets out specific requirements for the protection of water resources and the prevention and control of water pollution. For example, the law requires that wastewater discharges comply with relevant standards and that polluting enterprises obtain the necessary permits before discharging pollutants into water bodies [3].

Internationally, the United Nations Sustainable Development Goals (SDGs) also address water pollution and aim to ensure the availability and sustainable management of water and sanitation for all. Specifically, SDG 6 calls for the availability and sustainable management of water and sanitation for all and includes targets such as reducing the number of people who lack access to safe water and sanitation, improving water quality, and increasing water-use efficiency [14].

Another international standard that the RCS must comply with is the World Health Organization (WHO) guidelines for drinking water quality. These guidelines set out standards for the quality of drinking water to protect public health. The guidelines cover a range of parameters, including microbial and chemical contaminants, and are intended to be used as a basis for developing national standards for drinking water quality.

When comparing the RCS with other models of river basin management, a variety of factors must be considered. Table 1 provides a brief overview of some of the key characteristics of different models of river basin management.

Table 1

Characteristics of RCS

Model	Characteristics
Centralized	central government has a significant role in managing water resources
Decentralized	local communities are given more control over their water resources
Integrated	various stakeholders collaborate to manage water resources
Participatory	public participation is central to the management of water resources

The RCS can be considered a type of integrated model, as it involves various stakeholders working together to manage water resources. However, it also has elements of a centralized model, as local officials are appointed by the central government to oversee and enforce water pollution control measures.

Table 2

Key international legal instruments

Instrument	Purpose
UN watercourses convention	provides a framework for the management of international watercourses
Ramsar convention on wetlands	provides a framework for the conservation and wise use of wetlands
Basel convention on the control of transboundary movements of hazardous wastes and their disposal	regulates the transboundary movement of hazardous wastes
Stockholm Convention on Persistent Organic Pollutants	addresses the production, use, and disposal of persistent organic pollutants

Finally, when considering the potential for replication and scalability of the RCS, it is essential to recognize that the legal framework for water pollution control may differ



significantly from country to country. Table 2 provides an overview of some of the key international legal instruments related to water pollution control.

## 6. DISCUSSION

Since the RCS was fully implemented in 2016, there have been significant improvements to the management system and working hierarchy. However, various problems have been encountered, particularly early on during its implementation. These issues can be attributed to three major sources.

- Lack of clarity regarding the main duties and responsibilities of river chiefs. Although there has been an increase in legislation related to the river/lake chief systems in recent years, the statutory duties of river chiefs remain limited. This resulted in unclear delegation of responsibilities and an overreliance on the personal power of river chiefs, which can cause gaps in the implementation of the RCS. To address this, it is essential to establish clear legal responsibilities for river chiefs at different administrative levels through legislation. More provisions regarding the scope of application, delegation of responsibility, and legal liability should be established, and local legislation should stipulate the detailed responsibilities of the local hierarchy of chiefs.

- Incomplete accountability and supervisory systems. Although the RCS aims to assign responsibility for specific water affairs, there is a need for specific evaluation modes and methods for accountability. Problems such as unclear distribution of responsibilities, authority, and poor interoperability persist, which can lead to shirking duties and responsibilities. The impartiality of the accountability review process may not be guaranteed, and the current accountability mechanisms lack a legal foundation. Moreover, the supervision and management mechanisms of the RCS are not perfect, resulting in some river chiefs existing in name only with no assigned tasks or responsibilities. To address these issues, it is necessary to establish clear and comprehensive accountability and supervisory systems for the RCS. This includes establishing legal foundations for the accountability mechanisms, improving the impartiality of the accountability review process, and perfecting the supervision and management mechanisms of the RCS. Overall, there is a need to continue to develop and refine the RCS to ensure effective water governance in China.

- Despite significant advancements, governments still face challenges in implementing an upgraded version of the system. These challenges arise from various factors such as inadequate laws and regulations, insufficient accountability and oversight mechanisms, unclear division of responsibilities among different departments, and a lack of coordinated action. Addressing these issues will be crucial for the system's continued improvement.

The RCS model can be seen as a proactive response to the complex water issues faced by different regions, and its development has been significantly influenced by

each region's unique political context and history. The system's operation is deeply embedded in China's unitary system of government and the party-state hierarchy. It has undergone a transition towards national governance and has expanded our knowledge of the diverse approaches available for water management, providing valuable insights for other developing countries seeking to establish a similar river management system.

## 7. CONCLUSION

The normative construction of the RCS model of river basin water environment management under a legal perspective is an important and effective way to improve the management of water resources and protect the environment. The RCS model, which was proposed by the Chinese government in 2016, has gained widespread recognition and has been implemented in various regions of China. This model is characterized by the appointment of river chiefs at different administrative levels, who are responsible for the overall management of river basins, and the establishment of a system of rewards and punishments to encourage compliance with environmental regulations.

From a legal perspective, the RCS model is based on the principle of the rule of law, which emphasizes the importance of laws, regulations, and procedures in guiding and regulating social behavior. The implementation of the RCS model requires the establishment of a comprehensive legal framework, which includes laws and regulations governing water resources management, environmental protection, and administrative accountability. The enforcement of these laws and regulations is essential for the effective functioning of the RCS model.

The normative construction of the RCS model also highlights the importance of public participation and transparency in decision-making processes. To achieve the goals of the RCS model, it is necessary to involve various stakeholders, including government agencies, local communities, and private organizations, in the planning and implementation of water resources management policies. The transparency of decision-making processes is also important to ensure that the public has access to information and can hold decision-makers accountable.

In summary, the normative construction of the RCS model of river basin water environment management from a legal perspective is a promising approach to improve the management of water resources and protect the environment. By promoting the rule of law, public participation, and transparency, this model can contribute to the sustainable development of river basins and ensure the well-being of present and future generations. However, it is important to continue to evaluate and improve this model in light of changing environmental and social conditions.

## REFERENCES

- [1] LI Y., TONG J., WANG L., *Full implementation of the River Chief System in China. Outcome and weakness*, *Sust.*, 2020, 12 (9), 3754, DOI: 10.3390/su12093754.
- [2] LI J., SHI X., WU H., LIU L., *Trade-off between economic development and environmental governance in China: An analysis based on the effect of River Chief System*, *China Econ. Rev.*, 2020, 60, 101403. DOI: 10.1016/j.chieco.2019.101403.
- [3] WANG Y., CHEN X., *River chief system as a collaborative water governance approach in China*, *Int. J. Water Resour. Dev.*, 2020, 36 (4), 610–630. DOI: 10.1080/07900627.2019.1680351.
- [4] WANG X., WEI H., WANG Z., ZHAO W., *Research on the public behaviors to participate in the lake chief system-based on the survey of Hengshui City, China*, *J. Water Resour. Prot.*, 2022, 14 (12), 773–782. DOI: 10.4236/jwarp.2022.1412043.
- [5] HE L.-Y., HUANG G., *Can importing improve the energy efficiency? Theory and evidence from Chinese industrial firms*, *Int. Rev. Econ. Fin.*, 2023, 83, 451–469. DOI: 10.1016/j.iref.2022.09.003.
- [6] BU C., ZHANG K., SHI D., WANG S., *Does environmental information disclosure improve energy efficiency?*, *En. Pol.*, 2022, 164, 112919. DOI: 10.1016/j.enpol.2022.112919.
- [7] GAO D., MO X., XIONG R., HUANG Z., *Tax policy and total factor carbon emission efficiency: evidence from China VAT reform*, *Int. J. Environ. Res. Pub. Health*, 2022, 19 (15), 9257. DOI: 10.3390/ijerph19159257.
- [8] LIU H., CHEN Y.D., LIU T., LIN L., *The River Chief System and river pollution control in China: A case study of Foshan*, *Water*, 2019, 11 (8), 1606. DOI: 10.3390/w11081606.
- [9] ZHAN Z., *Study on China's River Chief system. Development history, security governance function and improvement prospects*, *Law Econ.*, 2023, 2 (3), 34–41. DOI: 10.56397/LE.2023.03.06.
- [10] ZHANG X., LI L., SU Z., LI H., LUO X., *Study on factors influencing public participation in river and lake governance in the context of the River Chief System based on the integrated model of TPB-NAM*, *Water*, 2023, 15 (2), 275. DOI: doi.org/10.3390/w15020275.
- [11] CHENG Z., LIU J., LI L., GU X., *Research on meta-frontier total-factor energy efficiency and its spatial convergence in Chinese provinces*, *En. Econ.*, 2020, 86, 104702. DOI: doi.org/10.1016/j.eneco.2020.104702.
- [12] WEN H., LIANG W., LEE C.-C., *Urban broadband infrastructure and green total-factor energy efficiency in China*, *Util. Pol.*, 2022, 79, 101414. DOI: https://doi.org/10.1016/j.jup.2022.101414.
- [13] GAO D., LIU C., WEI X., LIU Y., *Can River Chief System policy improve enterprises energy efficiency? Evidence from China*, *Int. J. Environ. Res. Publ. Health*, 2023, 20 (4), 2882. DOI: 10.3390/ijerph20042882.
- [14] ZHANG Z., XIONG C., YANG Y., LIANG C., JIANG S., *What makes the River Chief System in China viable? Examples from the Huaihe River Basin*, *Sust.*, 2022, 14 (10), 6329. DOI: doi.org/10.3390/su14106329.
- [15] SHEN K., JIN G., *The policy effects of local governments environmental governance in China. A study based on the evolution of the river director system*, *Soc. Sci. China*, 2018, 5, 92–115. DOI: 10.1080/02529203.2020.1806475.
- [16] ZHONGMING Z., LINONG L., XIAONA Y., WANGQIANG Z., WEI L., Ministry of Water Resources of the Peoples Republic of China [200801027], 2011.
- [17] WANG L.F., LI Y., *Chinese scheme to resolve the current complicated water issues: River chief system (RCS)*, *IOP Conference Series: Earth and Environmental Science*, 2018, 191 (1), 12019. DOI: 10.1088/1755-1315/191/1/012019.
- [18] HUANG Q., XU J., *Rethinking environmental bureaucracies in River Chiefs System (RCS) in China: A critical literature study*, *Sust.*, 2019, 11 (6), 1608. DOI: doi.org/10.3390/su11061608.